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white; anterior half of pectorals white, posterior blackish; between the gill-opening and the root of the upper margin of the pectorals a large black spot. Iris silvery, bluish black near the orbit. After death the sides above the lateral line acquire a number of close, vertical undulating lines and spots; beneath the lateral line appear fewer and more distant black lines.

D 17—4*/13—X, C 17 $\frac{1}{4}$, A 4/13—X, V 1/5, P 23, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Isle of France, Coromandel, Bay of Bengal, Massaua, (Red Sea,) China Seas.

TOTAL LENGTH: 3 ft.

The length of the head is $4\frac{2}{3}$ in the total. The orbit is surrounded by a circular, rather broad, adipose membrane. The diameter of the orbit is a little less than $\frac{1}{7}$ of the length of the head; the distance of the eyes across the forehead is a little less than two diameters. In the upper jaw appear on each side 20 to 25 large lancet-shaped teeth in the lower 10 to 15, of which the posterior ones are the largest of all; velvety teeth appear on the anterior part of vomer, on the palatals, pterygoids, on the tongue, and on the margin as well as the internal surface of each hyoid bone. The only perceptible, small elongated scales appear along the anterior dorsal, on the second dorsal, caudal and anal fins, and from behind the infraorbitals round the eye to the occiput. The vertical diameter in front of the anterior dorsal is $\frac{1}{7}$ of the total length. The lateral line deviates but little from the upper third of the body, till opposite the first spurious dorsal fin, when it suddenly descends, describing an arch which terminates nearly opposite the fourth spurious dorsal fin; from thence it proceeds in the middle of the body, over the strong keel in front of the caudal fin. Both in

* The anterior dorsal and the anal finrays are preceded by four spines (undivided rays) which however cannot distinctly be perceived without removing the covering scales and integuments. The caudal fin consists of 17 central branched rays, above and below which appear 14 gradually decreasing, undivided rays. The following number of finrays have been given by the different describers: Russell, whose figure is more correct than his description: D 16—16, C 24, A 14, V 6, P 22, Br. VII.

Rüppell: D 16—14—X, C 26, A 3/14—X, V 1/5, P 24, Br. VI.

Cuvier and Valenciennes: D 16—1/15—X, A 1/15—IX, P 22 or 23, Br. VII.

front of and behind the arch, the lateral line makes a few, in different individuals varying, slight undulations. The spines of the anterior dorsal fin terminate in excessively slender points, which when uninjured are completely connected by the membrane. Such, indeed, was the case but in very few young individuals observed at Pinang, the instant they were taken out of the sea. The membrane, however, is easily torn and the spines are left each terminating in a filament as represented by Dr. Rüppell (Atlas: Taf. 25, fig. 1). The fish occurs at Pinang during all seasons, but not in numbers. As an article of food it is there valued both in its fresh and dried state. Single individuals may be seen in the cold season, but very rarely, in the Calcutta bazars. But they are not eaten by Europeans, as this as well as other Indian mackarels requires to be very fresh, to be fit for the table.

CYBIUM LINEOLATUM, Cuvier.

Cybiium lineolatum, Cuv. and Val. VIII. 170.

Cybiium lineolatum, Bélanger : Voyage, p. 366, Pl. II. Fig. 1.

Cybiium lineolatum, Bleeker : Verh. Bat. Gen. XXII. 4.

Tanggiri of the Malays.

Head above and back intense blue with golden green reflections, lighter on the sides of the head and body, to a little beneath the anterior half of the lateral line; the rest of the sides, the abdomen, opercles and cheeks shining silvery with pale lilac reflections; membrane of anterior dorsal fin pale lilac grey, minutely dotted with brown, upper margin black; second dorsal and spurious fins pale silvery lilac grey; caudal silvery blackish grey; anal and spurious fins silvery white; ventrals white; pectorals silvery white, minutely dotted with black on the posterior outer half and on the whole inner surface, so closely as to appear blackish. Iris silvery, bluish black towards the orbit. After death appear several series of black spots: irregular above the lateral line; beneath the latter three or four series of longitudinal short linear spots, each series appearing like an interrupted line.

D 16—4/12—IX, C $15\frac{11}{12}$, A $5\frac{1}{4}$ —X, V $1\frac{1}{5}$, P 21, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Malabar, Bay of Bengal, Madura, Java.

TOTAL LENGTH: 2 feet.

The length of the head is $4\frac{1}{2}$ in the total measured to the centre of

the posterior caudal margin, but $\frac{1}{5}$ to the centre of a vertical line between the points of the caudal lobes. The diameter of the orbit is $4\frac{1}{2}$ in the length of the head; the margin of the orbit supports a rather broad circular adipose membrane. The distance of the eyes across the forehead is $1\frac{1}{4}$ diameter. On each side of both jaws appear upwards of 18 lancet-shaped large teeth, of which, however, more than 10 or 11 are seldom present. The middle ones of the lower jaw are the largest. On the anterior part of the vomer appears a pointed triangular spot with velvety teeth, and on each palatal and pterygoid a rather broad continued line of similar teeth. Others appear at the root of the small oval, flattened tongue, on the margin and internal surface of each hyoid bone. The scales are perceptible in the places noted under *Cybbium commersoni*. The greatest vertical diameter slightly exceeds $\frac{1}{6}$ of the total length. The lateral line, a series of short rectangular elevations, commences following the upper fourth of the body, from which it gently deviates towards the termination of the second dorsal fin; from thence it continues declining to below the middle of the body, opposite the fifth spurious fin, when it slightly ascends towards the strong keel in front of the caudal fin. The spines of the anterior dorsal fin are very slender, and the membrane is easily detached, so as to leave the filamentous points of the anterior and the whole of the posterior five or six very short spines unconnected. The anterior spine, scarcely equalling the diameter of the eye, is $\frac{2}{3}$ of the length of the second, which is shorter than the third. The fourth, the longest, is $\frac{1}{4}$ of the length of the head; the rest gradually decrease; the sixteenth is so short and slender that it easily may escape observation. The anterior spurious fin is often by a short membrane connected to the second dorsal and anal. Each caudal lobe equals the length of the head. The length of the pectorals is $8\frac{1}{2}$ in the total; the ventrals $\frac{1}{3}$ of the pectorals.

At Pinang this species occurs at all seasons, but not in numbers. In quality it resembles *C. commersoni*, and like it, a solitary, stray one, may during the cold season, be seen in the fish bazars of Calcutta.

CYBIUM GUTTATUM. (Bloch-Schneider).

Scomber guttatus, Bl.-Schn. 23, Pl. 5.

Russell, CXXXIV. Wingeram.

Scomber leopardus, Shaw: Gen. Zool. IV. 591.

Cybiium guttatum, Cuv. R. A. II. 200 (').

Cybiium guttatum, Cuv. and Val. VIII. 173.

Cybiium kuhlii, Cuv. and Val. *ibid.* 178 (*Young*).

Cybiium guttatum Richardson, Report, 1845, 268.

Cybiium guttatum, Bleeker: Verh. Bat. Gen. XXII. 4.

Tanggiri pápan of the Malays.

Adult. Membrane of the first seven or nine spines of anterior dorsal fin black, that of the succeeding spines white, minutely dotted with brown, and broadly edged with black; rest of the body and eyes coloured like *Cybiium lineolatum*. After death appear on the back and upper half of the sides numerous black rounded and oval spots, of different sizes, mostly irregularly scattered, here and there in regular longitudinal series.

D 18—4/16—X, C $15\frac{1}{10}$, A 5/16—IX, V $1\frac{1}{5}$, P 21, Br. VII. or D 17—5/16—X, A 6/16—IX.

Young. Ventrals, second dorsal, anal and their spurious fins pale yellowish; caudal whitish, the root the posterior margin and between the central five rays silvery bluish. Rest of the body like the adult, but no black spots appear after death.

D 17—5/17—VII, A 6/16—VII, or D 15—5/16—VIII, A 6/16—VIII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Java, Madura, Malabar, Coromandel.

TOTAL LENGTH: 3 feet.

The length of the head is $\frac{1}{5}$ of the total, measured to the centre of the posterior caudal margin, but $5\frac{1}{2}$ in the total, measured to the centre of a vertical line between the points of the caudal lobes. The orbit is surrounded by a circular adipose membrane. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. The distance of the eyes across the forehead is $1\frac{1}{2}$ diameter. The maxillary teeth are generally shorter and less broad than in *C. commersoni* or *lineolatum*. On each side of the upper jaw appear upwards of 19, of the lower upwards of 15 teeth, The velvety teeth are disposed as in *C. lineolatum*, but they are more numerous, as the whole of the roof of the mouth, bounded in front by the vomer and on each side by the palatals, is studded with patches of teeth. The very centre of the roof behind the anterior pointed part of vomer, presents a singular appearance: it is covered with linear ele-

variations separated from each other by narrower lines of the naked lining membrane. The greatest vertical diameter in front of the second dorsal fin equals the length of the head. The lateral line, consisting of little rectangular elevations, follows the outline of the back while gently declining till opposite the third or fourth dorsal spurious fin; from thence it continues straight to the strong keel in front of the caudal fin. In the young of this and the preceding species the latter keel is very little developed. Single individuals occur at Pinang at all seasons, and are valued as articles of food. In Calcutta they are very rarely seen, and during the cold season only.

GEN. *TRICHIURUS*, Linné, 1766.

Body elongated, compressed, with a single extensive dorsal fin; tail terminating in a slender finless filament; neither ventrals nor anal, but instead of the latter a number of minute spines; muzzle elongated; lower jaw projecting beyond the upper, both with distant lancet-shaped teeth, among which several arched ones longer than the rest, and with the posterior part of the point barbed; each palatal with a series of velvety teeth. Branchiostegous rays seven.

TRICHIURUS HAUMELA, (Forskål.)

Willoughby: App. Pl. 3. Fig. 3.

Clupea haumela, Forskål: Fauna Arab. p. 72, No. 106.

Clupea haumela, Linné: Syst. 1408.

Lacépède, II. Pl. 7, Fig. 1.

Russell XLI. Sawala.

Trichiurus lepturus, Buchan. Ham. Fishes, p. 31, 364.

Trichiurus haumela, Cuvier, R. A. II. 218.

Trichiurus haumela, Cuv. and Val. VIII. 249.

Trichiurus haumela, Rüppell, N. W. Fische, 41.

Trichiurus haumela, Swainson, II. 254.

Trichiurus haumela, Bleeker: Verh. Batav. Gen. XXII. 4.

Ikan Púchuk of the Malays.

Adult. Head above, back and naked point of the tail blue blackish, lighter silvery on the jaws, sides of the head and body; abdomen silvery; dorsal rays and membrane pale reddish yellow, the latter to the twelfth ray, and from thence the upper half, minutely dotted with

black, so as to appear blackish ; anterior third of pectorals pale reddish yellow, the rest blackish. Iris silvery blue, blackish towards the orbit.

Young. Head above, back and naked point of the tail silvery bluish ; the rest of the body shining silvery ; dorsal and pectorals yellowish white, minutely dotted with black like the adult, without, however, acquiring the blackish general appearance of the latter.

D 127 to 133, P 11, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Chusan, Canton River, Coromandel, Bay of Bengal, Gangetic estuaries, Malabar, Djetta, (Red Sea,) Java, Celebes, Madura.

TOTAL LENGTH : 2 feet 8 inch.

The length of the head, measured from the symphysis of the lower jaw to the termination of the opercle, is $\frac{1}{7}$ of the total. The diameter of the eye is $\frac{1}{8}$ of the length of the head, or $\frac{1}{2}$ of the vertical diameter of head through the eye itself. In the upper jaw appear on each side upwards of 15 distant teeth, of which the anterior pair which are present in the very young ones only, are directed forwards. Behind these appear a pair, or a single lower arched tooth, the posterior part of the point of which is barbed. Next follow 3 or 4 very small lancet-shaped, behind which is a very long arched, half-barbed tooth. The rest of the space is occupied by some distant lancet-shaped teeth, of which those in the middle are the largest. On each side of the symphysis of the lower jaw appears an arched tooth, like the corresponding one of the upper jaw, but shorter. Behind the tooth is a vacant space, followed by upwards of 12 lancet-shaped teeth, which with the exception of one or two half-barbed in the middle, are smaller than the corresponding of the upper jaw. Along the margin of each palatal is a series of velvety teeth. The tongue is small, oval, a little pointed, and smooth. The anterior dorsal ray is $\frac{1}{4}$ of the length of the head. The greatest vertical diameter of the body is generally $\frac{1}{15}$, but in the adult $\frac{1}{17}$ of the total length. This species is excessively numerous at all seasons in the Straits of Malacca and in the estuaries of the Ganges. The common length is about one foot, and but a solitary individual of 2 feet 8 inch was observed at Pinang. The fish is consumed fresh, but chiefly dried, by the natives, and forms in the latter state an article of exporta-

tion. It is of voracious habits, devouring its own kind, as well as other fishes, and crustacea. The adult had a nodulous enlargement of the size of a coffee seed, on one of the anal interspinal bones, similar to those observed in *Platax arthriticus*, Cuv. and Val.

TRICHIURUS SAVALA, Cuvier.

Trichiurus savala, Cuvier, R. A. II. p. 219.

Trichiurus armatus, Gray : Zool. Misc. 9, (*Excl. Syn.*
Sawala, Russell.)

(*Icon.*) *Trichiurus armatus*, Gray : Ill. Ind. Zool. II. Pl. 93,
Fig. 1.

Trichiurus savala, Cuv. and Val. VIII. p. 251, Pl. 224.

Trichiurus savala, Cantor : Ann. Nat. Hist. IX. 15.

Trichiurus armatus, Richardson, Report, 1845, 268.

Púchuk of the Malays.

Head above, back and the naked point of the tail pale bluish, all other parts shining silvery; dorsal and pectoral rays yellowish white, their membrane hyaline. Iris silvery, bluish towards the orbit.

D 112 to 120, P 11, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Canton River, Chusan, Pondicherry, Bay of Bengal, Gangetic estuaries, Malabar, China Seas.

TOTAL LENGTH : 1 foot 4 inch.

The length of the head is from $6\frac{1}{2}$ to $7\frac{1}{4}$ in the total. The diameter of the eye is from $8\frac{1}{2}$ to $\frac{1}{9}$ of the length of the head, or $\frac{1}{3}$ of the vertical diameter of the head through the eye itself. The anterior rays of the dorsal fin are proportionally shorter than in *T. haumela*: the length of the first ray but slightly exceeds the diameter of the eye. The lancet-shaped teeth of the jaws are proportionally smaller than in the preceding species, which it in other respects greatly resembles. Although not very scarce at Pinang and at the Sandheads, it is of far rarer occurrence than *T. haumela*, which it resembles in voracious habits. As observed by M. M. Cuvier and Valenciennes, neither species is electrical, but both give at certain seasons, like many other fishes, a vivid phosphoric light.

GEN. ELACATE, Cuvier, 1829.

Head depressed; body fusiform; a number of free spines preceding the dorsal fin, but none the anal; no keel in front of the caudal fin.

ELACATE BIVITTATA, Cuv. and Val.

Elacate bivittata, Cuv. and Val. VIII. 338.

Elacate bivittata, Temm. Schl. Fauna Japon. Pisc. 104, Pl. LVI.

Elacate bivittata, Richardson, Report, 1845, 269.

Head above and back inky, or bluish black; from the posterior part of the orbit to the root of caudal, a pale silvery longitudinal band, dotted with black; from the shoulder, enclosing the posterior $\frac{3}{4}$ of the lateral line, an intense bluish black band; beneath which a narrower, pale silvery, dotted with black; under which a bluish black; throat and abdomen pale silvery, dotted with black; upper half of sides of the head silvery blackish; lower half: pale silvery dotted with black; dorsal free spines, and all fin rays whitish; their membranes pale greyish, minutely dotted with brown so as to acquire a general brownish, or bluish black appearance; caudal whitish at the root, and with a white triangular spot at the upper and lower angle; in some the posterior margin whitish; pectorals whitish at the root, the rest intense black. Iris silvery, minutely dotted with black.

D 8—2/30, 34, 35 or 36, C $17\frac{13}{13}$, A 2/25, 26, 27 or 28, V $1\frac{1}{5}$,
P 20, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Moluccas, Japan, China Seas.

TOTAL LENGTH : 2 feet.

The length of the head is $\frac{1}{5}$ of the total. The eye is surrounded by a large circular adipose membrane. The transversal diameter of the orbit is $\frac{1}{4}$, the vertical $\frac{1}{5}$ of the length of the head. The distance of the orbits across the forehead slightly exceeds their transversal diameter. The diameter of the eye itself is $\frac{1}{6}$ of the length of the head. Besides the cardlike teeth of both jaws, the vomer and the palatals, the whole of the roof of the mouth between the three latter bones, the tongue and the innerside of the gums are covered with velvety teeth. As in *E. pondiceriana*, Cuv. and Val. the upper surface of the cranium has on each side a fascicle of striæ, radiating forwards and backwards. They are indeed less apparent during life and in specimens preserved in spirits, than in dried ones, which probably accounts for M. M. Cuvier and Valenciennes describing the surface as nearly smooth (VIII. p. 338.) On each opercle appear upwards of 9 backwards radiating, sharp striæ. Each side of the occiput and the cheeks are covered with small oval,

slightly pointed scales, like those of the body ; the rest of the head is naked. The eight free dorsal spines are all directed backwards ; each is attached to its groove by a small triangular membrane. The anterior ray of the dorsal and anal fins is shorter than the second, and not branched like all the succeeding. The lateral line proceeds nearly straight towards the termination of the pectorals from whence it gently declines, keeping the middle of the body, and terminating a little in front of the posterior margin of the caudal. It makes several slight undulations, and the anterior portion is sometimes found double, the one above the other. The length of the caudal fin is $\frac{1}{3}$ of the total ; the posterior margin is straight, vertical. The pectoral is a little falcated ; the length $\frac{1}{7}$ of the total, nearly double the length of the ventrals. The stomach is an elongated muscular sac ; at some distance from the pylorus appears a cœcum, nearly as long as the stomach, from the side of which proceed a number of short processes, each terminating in many minute branches, all forming a countless mass of cœca. The intestinal canal makes a single circumvolution : its length is about $\frac{1}{3}$ of the total. The liver is elongated, single-lobed. The gall-bladder is reduced to a narrow tube. The spleen is small triangular. There is no air-vessel. In several dissected the stomach contained fishes (*Clupeoidæ*) and *Loligo*. Single individuals occur at all seasons at Pinang. They are eaten by the natives.

GEN. CHORINEMUS, *Cuv. and Val.* 1831.*

Body oblong, compressed ; no keel in front of the caudal fin ; anterior dorsal fin consisting of singly moveable spines, each with a small membrane ; the first of these spines preceded by an immoveable one,† more or less hid in the skin and pointing forwards ; rays of the second dorsal and anal fin either entirely detached, or united by a membrane so brittle, as to easily disappear, and make the rays resemble spurious fins ; two free spines, resembling those of the anterior dorsal, behind the anus.

* Substituted for *Scomberoides*, Lacépède, 1800.

† As the immoveable spine is rarely perceptible except in very young individuals, it will not be given in the formulas of the dorsal fins, but special mention will be made of it.

CHORINEMUS LYSAN, (Forskål.)

Scomber lysan, Forskål: Pl. 54, No. 67.

Scomberoide commersonien, Lacép. II. Tab. 20, fig. 3.

Russell, CXLI. Aken Parah.

Scomber madagascariensis, Shaw, Gen. Zool. IV. Pt. II. p. 590,
Pl. 85.

Lichia lysan, Rüppell: Atlas, p. 91.

Scomberoide commersonien, Cuv. R. A. II. 204 (').

Scomber lysan, Cuv. *Ibid*.

Scomber madagascariensis, Bennett: Life of Raffles.

Chorinemus commersonianus, Cuv. and Val. VIII. 370.

Chorinemus lyzan, Cuv. and Val. VIII. 387.

Chorinemus lysan, Rüppell, N. W. Fische, 44.

Chorinemus commersonii, Bleeker: Verh. Batav. Gen. XXII. 4.

Tallang raya of the Malays.

Head above and back golden greenish olive, the rest of the head and body brilliant golden citrine or sulphur colour; second dorsal, anal, pectoral and caudal like the body, but not golden; posterior margin of caudal blackish, anterior dorsal, ventrals and post-anal spines white. Iris golden sulphur-coloured, greenish towards the orbit.

After death. Head above and back greyish olive, lighter on the sides towards the lateral line; rest of the head and body silvery; sides along or above the lateral line with 6 or 7 large oval blue-blackish or greyish spots; second dorsal, anal, pectoral and caudal yellowish white. Iris silvery.

D 7 or 6— $1/20$, C $17\frac{7}{7}$, A 2— $1/18$, V $1/5$, P 18, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Sumatra, Java, Madura, Coromandel, Red Sea, Madagascar.

TOTAL LENGTH: 2 feet.

The length of the head is $4\frac{2}{3}$ in the total, measured to the centre of the posterior margin of the caudal; the height at occiput nearly equals the length of the head. The diameter of the orbit, supporting an adipose membrane, is $\frac{1}{4}$ of the length of the head; the distance across the forehead equals the diameter. The angle of the mouth is situated at some distance behind the orbit; the distance from the muzzle to the angle of the mouth slightly exceeds $\frac{1}{2}$ the length of the head. The immoveable spine preceding the first dorsal, is apparent in the

very young, but later it becomes entirely hid by the integuments. The lateral line forms an obtuse angle opposite the first dorsal spine, and at equal distance between the latter and the middle of the pectoral fin. The anterior of the black spots which appear after death is situated beneath the origin of the lateral line, between it and the root of the pectoral; the upper part of the opercle becomes frequently blackish; of the rest of the spots, the two or three are above, but touch the lateral line; the others are altogether above it. The scales are minute, oval, with a longitudinal central furrow, and enveloped in the transparent epidermis. The greatest vertical diameter of the body, in front of the posterior dorsal fin varies from $3\frac{1}{4}$ to $3\frac{1}{2}$ in the total length.

At Pinang single individuals occur at all seasons. They are eaten either fresh or dried by the natives.

CHORINEMUS TOL, Cuvier and Valenciennes.

Russell, CXXXVIII. Tol Parah.

Chorinemus tol, Cuv. and Val. VIII. p. 385.

Head above and back metallic bluish grey, lighter on the sides to a little above the lateral line; opercles and the rest of the body silvery white; pectorals and caudal yellowish white, the latter edged with blackish; the rest of the fins white; the angle of the second dorsal fin black. Iris silvery, bluish black towards the orbit.

After death. Upper part of opercle and a spot immediately behind it, metallic bluish grey; in some a series of from 6 to 8 similar spots above the lateral line.

D 7—1/20 or 21, C $17\frac{6}{8}$, A 2—1/18, 19 or 20, V 1/5, P 18, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Amboyna, Buru, Coromandel, Bay of Bengal, mouths of the Ganges, Malabar.

TOTAL LENGTH: $8\frac{6}{8}$ inch.

The length of the head is from $4\frac{3}{4}$ to $\frac{1}{5}$ of the total, measured to the centre of the posterior margin of the caudal fin; the depth at occiput is $\frac{3}{4}$ of the length of the head. The transversal diameter of the orbit is $3\frac{1}{2}$ in the length of the head; the distance across the forehead equals the diameter. The greatest vertical diameter of the body equals the length of the head. The lateral line makes a very obtuse angle opposite the third dorsal spine, from thence it declines till opposite the third or fourth ray of the second dorsal, when it proceeds straight to

the centre of the caudal. The length of the lobes of the caudal equals that of the head, but generally one of the lobes is shorter than the other. The length of the pectorals and ventrals slightly exceeds $\frac{1}{2}$ of the length of the head. The angle of the mouth is situated beneath the centre of the orbit; the lower jaw slightly projects beyond the upper. The scales appear like numerous, close, horizontal needles. The immoveable spine preceding the first dorsal, is in some partially apparent, in others entirely hidden. Younger individuals are at Pinang excessively numerous during all seasons, and are dried by the natives.

GEN. TRACHYNOTUS, (*Lacép.*) Cuvier, 1817.

(*CÆSIOMORUS*, *Lacép.* 1800.—*ACANTHINION*, *Lacép.* 1802.—)

Differs from Gen. *Lichia* by a more elevated body, a profile more rapidly descending in front of the eyes, and by the more elongated points of the second dorsal and anal fin.

TRACHYNOTUS MOOKALEE, Cuv. and Val.

Gasterosteus ovatus, Linné, Syst : 1325 ?

Centronote ovale, Lacépède ?

Russell, CLIV. Mookalee Parah.*

Trachinotus mookalee, Cuv. and Val. VIII. 423.

Head above and back silvery green; sides above the lateral line golden green; beneath the line, abdomen and opercles golden gamboge; all fins gamboge; anterior margin of dorsal spines and first ray of second dorsal blackish; membrane of second dorsal, caudal and pectorals minutely dotted with brown. Iris golden gamboge, green towards the orbit.

D 6—1/19. C 17 $\frac{6}{8}$, A 2—1/17, V 1/5, P 20, Br. VII.

HABIT.—*Sea of Pinang.*

Coromandel, Malabar.

TOTAL LENGTH : 8 inch.

The length of the head is $\frac{1}{4}$ of the total measured to the centre of the posterior margin of the caudal; the depth at the occiput exceeds by $\frac{1}{3}$ the length of the head. The diameter of the orbit is $\frac{1}{3}$ of the

* Dr. Rüppell considers this identical with *Trachynotus falcatus*, (Forsk.) of which also the following synonymes are given : *Scomber falcatus*, Forskål, p. 57, No. 76.—*Cæsiomorus blochii*, Lacép. III. Tab. 3, Fig. 2.—(Rüppell : Atlas, p. 88.) To these the author has later added : *Trachinotus drepanis*, Cuv. and Val. VIII. 429.

length of the head. The infraorbital is broad, rounded in front, tapering to a point beneath the centre of the orbit, so as to leave the inferior half of the narrow maxillary bone exposed. The preopercle consists of a very narrow vertical portion, and a shorter, broader horizontal; where both join, the posterior margin describes a segment of a circle. The external surface is divided in two parts by a ridge in the middle: the anterior part has at the angle four longer and several smaller spine-like radiating processes, between which appear numerous radiating lines which continue along the vertical part of the posterior margin, which has the appearance of being very finely denticulated in an oblique upward direction. The angle of the mouth is situated in front of the orbit. In a young individual, $3\frac{5}{8}$ inches in length, a band of card-like teeth appear in both jaws; but in another, 8 inches in length, the jaws have no perceptible teeth, and such was also the case in those examined by Russell. M. M. Cuvier and Valenciennes describe their specimens of *T. mookalee* with velvety, easily perceptible teeth in both jaws.* It would therefore appear that some, not all, individuals with age lose their teeth. As a young individual examined at Pinang has very distinct teeth, it follows that the division adopted by Dr. Rüppell (Atlas, p. 88) of *Trachinotus*, Lacép. containing species supposed to have no teeth, is inadmissible. The anterior opening of the nostrils is much smaller than the posterior.

The lateral line commences slightly ascending till above the point of the pectoral fin, from whence it gently descends till opposite the posterior third of the second dorsal, when it proceeds straight to the middle of the caudal fin. The scales of the body are very minute, appearing like points. In the young individual examined at Pinang, the spine preceding the moveable dorsal ones, had the point projecting, but in the larger one, although perceptible, it was imbedded in the integuments. In Russell's figure the point projects. The length of the point of the second dorsal slightly exceeds $\frac{2}{3}$ of the extent of the base of the fin. The point of the anal is a little shorter. The greatest vertical diameter, in front of the second dorsal, is by $\frac{1}{6}$ less than half of the total length. The lobe of the caudal is $\frac{1}{3}$ of the total length. The length of the pectorals is $\frac{3}{4}$ of the head; that of the ventrals $\frac{1}{2}$

* *T. blochii* (Lacép.) and *T. falcatus*, (Forsk^{sk}), which Dr. Rüppell considers to be identical with the present species, have no teeth. (Cuv. and Val. VIII.)

of the pectorals. The two above mentioned individuals were observed at Pinang in June, 1843, and in February, 1845.

TRACHYNOTUS QUADRIPUNCTATUS, (Rüppell.)

Cæsiomorus quadripunctatus, Rüppell: Atlas, p. 90, Tab. 24.

Fig. 1.

Trachinotus quadripunctatus, Cuv. and Val. VIII. 434.

Head above and back silvery greyish green, lighter on the sides to a little above the lateral line; rest of the sides, abdomen, opercles and cheeks silvery white; on the lateral line 2 to 5 distant black spots; fins hyaline; point of second dorsal and anal, and lobes of caudal black. Irish silvery, greenish towards the orbit.

D 6— $1\frac{1}{22}$, C $17\frac{6}{6}$, A 2— $1\frac{1}{22}$, V $1\frac{1}{5}$, P 17, Br. VII.

HABIT.—*Sea of Pinang.*

Massaua, (Red Sea,) Seychelle Islands.

TOTAL LENGTH: $7\frac{6}{8}$ inch.

The length of the head is $4\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at the occiput equals the length of the head. The diameter of the orbit is $3\frac{1}{2}$ in the length of the head. The nostrils, the infraorbital and the preopercle resemble *T. mookalee*. In both jaws, on the vomer and palatals appear card-like teeth. The lateral line is slightly arched downwards till the origin of the second dorsal fin, from whence it proceeds straight in the middle of the body towards the caudal. The scales are minute, scarcely perceptible. In the individual examined at Pinang the point of the immoveable spine, preceding the first dorsal, projected far beyond the integuments. On the left lateral line appeared four small black spots: the first opposite the 4th dorsal spine, the second, the largest of all, opposite the root of the second dorsal, the third opposite the middle of, and the fourth opposite the termination of the second dorsal. On the right lateral line, however, the last spot was absent. The individual described by Dr. Rüppell had on each side two such spots, corresponding to the second and third in the present. In those examined by M. M. Cuvier and Valenciennes the number of spots varied from 3 to 5. The greatest vertical diameter of the body in front of the second dorsal is $2\frac{3}{4}$ in the total length, measured to the centre of the posterior margin of the caudal. The length of the point of the second dorsal equals the extent of the base of the fin; that of the anal

slightly exceeds it. The length of the caudal lobes is $2\frac{1}{2}$ in the total, measured as above observed. The pectorals are $\frac{2}{3}$ of the length of the head; the ventrals $\frac{2}{3}$ of the pectorals. A single individual was taken at Pinang in June 1845, while unusually strong southerly winds prevailed. The fishermen asserted the species to be of very rare occurrence.

GEN. APOLECTUS, *Cuvier and Valenciennes*, 1831.

Differs from *Trachynotus* by the ventral fins being fixed under the throat.

APOLECTUS STROMATEUS, Cuv. and Val.

Apolectus stromateus, Cuv. and Val. IX. 439.

Head above back and sides to the lateral line silvery brownish olive; cheeks, opercles and abdomen silvery pale neutral tint, everywhere minutely dotted with black; dorsal and anal pale greenish olive, minutely dotted with black; edges and the posterior part, containing the 3 or 4 last rays yellowish white; ventrals blackish; pectorals yellowish white, minutely dotted with black; caudal yellowish white, posterior half minutely dotted with black. Iris silvery buff, orbital half blackish blue.

D 4—1/43, C $17\frac{11}{11}$, A 2—1/37, V 1/5, P 21, Br. VI.

HABIT.—*Sea of Pinang.*

Java, Pondicherry.

TOTAL LENGTH: $3\frac{5}{8}$ inch.

The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal fin; the depth at occiput exceeds by $\frac{1}{4}$ the length. The diameter of the eye is $\frac{1}{3}$ of the length of the head. In each jaw appears a single series of excessively fine teeth. The greatest vertical diameter in front of the second dorsal fin is $1\frac{2}{3}$ in the total length. In front of the first minute dorsal spine appears an immoveable forward-pointing one, anterior to which two minute spines may be felt by passing the finger along that part of the back. The length of the point of the second dorsal and anal fins is $2\frac{2}{3}$ in the total. That of the falcated pectorals and caudal lobes is $\frac{1}{3}$ of the total length. The ventrals are $\frac{1}{2}$ of the pectorals; the rays are very slender. A single individual was observed at Pinang in June, 1844.

GEN. CARANX, (*Lacép.* 1800,) *Cuvier*, 1829.

Lateral line more or less mailed with scaly plates, each keeled and

with a spine; two dorsal fins; a horizontal immoveable spine in front of the anterior dorsal; two free spines in front of the anal; body, the lateral line excepted, covered with small scales; crest of cranium trenchant; last rays of second dorsal often slightly connected; in some separated in spurious fins.

A.—With several spurious fins behind the second dorsal and anal.

CARANX ROTTLEI, (Bloch.)

Scomber cordyla, Linné, Syst. 1332?

Scomber rottleri, Bloch, Tab. 346.

Russell, CXLI. Woragoo.

Scomber rottleri, Shaw, IV. 598.

Caranx rottleri, (Lacép.) Rüppell: Atlas, 102.

Caranx rotleri, Cuv. R. A. II. 208 (')

Caranx rotleri, Cuv. and Val. IX. 29.

Caranx rotleri, Rüppell, N. W. Fische, 48, 52.

Caranx rotleri, Richardson, Report, 1845, 273.

Head above and back steel blue or silvery dark green, lighter on the sides towards the lateral line; the latter as well as the rest of the body shining silvery; on the upper part of opercle a bluish black spot; fins transparent, yellowish; point of the second dorsal, and margin of the caudal minutely dotted with black. Iris silvery; adipose fold of the orbit pale amber-coloured.

D 8—1/10 or 11—IX, C 17 $\frac{7}{8}$, A 2—1/8—VIII or VII, V 1/5, P 22.

Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Coromandel, Malabar, Massaua, (Red Sea,) China Seas.

TOTAL LENGTH: 7 inch.

The length of the head is $\frac{1}{4}$ of the body, the caudal not included; the greatest vertical diameter, in front of the second dorsal fin, is $3\frac{1}{2}$ in the length of the body. The diameter of the orbit is a little less than $\frac{1}{3}$ of the length of the head; the broad adipose fold of the orbit leaves a vertically oval space, in which the eye appears. The anterior part of the lateral line is formed by very small rounded scales and describes a short high arch, which terminates opposite the middle of the anterior dorsal fin; the rest of the line is straight, consisting of 53 to 55 oblique, keeled and spinous plates. The anterior of the latter are narrow; each nearly $\frac{1}{2}$ of the vertical diameter of the body; the posterior ones

increase in breadth and entirely cover the tail. The falcated pectoral fins are $3\frac{1}{2}$ in the total length, measured to the centre of the posterior margin of the caudal. Single individuals occur at all seasons at Pinang. They are eaten by the natives.

B.—Without spurious fins behind the second dorsal and anal fins.

CARANX VARI, Cuv. and Val.

Caranx vari, Cuv. and Val. IX. 48.

Head above and back steel blue with silvery green reflections, lighter on the upper half of the sides; the rest of the body shining silvery; abdomen with rose-coloured reflections; on the upper part of the opercle and at the commencement of the lateral line a large pale bluish-black spot; anterior dorsal fin black; second dorsal and caudal pale yellowish white, their marginal halves minutely dotted with black; the rest of the fins hyaline, white; the middle of the anal sparingly dotted with brown. Iris silvery; adipose fold of the orbit pale amber-coloured.

D $8\frac{1}{2}$, C $17\frac{1}{4}$, A $2\frac{1}{2}$, V $1\frac{1}{5}$, P 19, Br. VII.

HABIT.—*Sea of Pinang.*

Pondicherry.

TOTAL LENGTH: $6\frac{5}{8}$ inch.

The length of the head is $3\frac{1}{2}$ in that of the body, or $3\frac{3}{4}$ in the total measured to the centre of the posterior margin of the caudal. The inferior margin of the opercle is very slightly concave. The diameter of the orbit is $3\frac{1}{2}$ in the length of the head; the opening of the adipose fold of the orbit is vertically oval. The greatest vertical diameter of the body, in front of the second dorsal, is $\frac{1}{3}$ of the length of the body. The arched portion of the lateral line extends to opposite the anterior part of the second dorsal, the straight portion consists of from 55 to 58 plates, none of which exceeds in height $\frac{1}{9}$ of the greatest vertical diameter of the body. The falcated pectorals are $3\frac{1}{2}$ in the total length. This species is of uncommon occurrence at Pinang.

CARANX MATE, Cuv. and Val.

Caranx mate, Cuv. and Val. IX. 54.

Head above and back steel blue, with silvery green reflections; lighter on the upper half of the sides, rest of the body shining silvery; abdomen with mother-of-pearl reflections; pectoral, caudal and second

dorsal yellowish white, the latter minutely dotted with black towards the margin; first dorsal, ventrals and anal whitish, the latter sparingly dotted with brown; upper part of opercle with a bluish black spot. Iris silvery; adipose fold of the orbit pale amber-coloured.

D 8—1/24, C 17 $\frac{7}{7}$, A 2—1/20, V 1/5, P 22, Br. VII.

HABIT.—*Sea of Pinang.*

Seychelles, New Guinea, Anjer, Pondicherry.

TOTAL LENGTH: 9 $\frac{6}{8}$ inch.

The length of the head slightly exceeds 3 $\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at the occiput is $\frac{3}{4}$ of the length of the head. The diameter of the orbit is 3 $\frac{2}{3}$ in the latter; the opening of the adipose fold of the orbit is vertically oval. The lower margin of the opercle is nearly straight, or slightly concave about the middle. The greatest vertical diameter of the body in front of the second dorsal is 3 $\frac{1}{2}$ in the total length. The arched portion of the lateral line terminates opposite the anterior fourth of the second dorsal; the rest is straight and covered by 37 to 40 plates, none of which in height exceeds $\frac{1}{8}$ of the greatest vertical diameter of the body. The length of the falcated pectorals is 3 $\frac{1}{3}$ in the total. The last dorsal and anal ray is stronger and more elongated than the preceding ones, and as the connecting membrane easily becomes torn, these two rays acquire the appearance of spurious ones. M. M. Cuvier and Valenciennes describe *C. xanthurus* as corresponding in every respect to the present species, except in its having a series of eight or nine dorsal spots of a darker blue than the rest of the back.

From *C. affinis*, Rüppell, (*Neue Wirbelth. Fische*, 49, Tab. 14, Fig. 1.) the present also differs but slightly; in *affinis* the head is $\frac{1}{4}$ of the total length, and the pectorals equal the length of the head: both are therefore shorter than in the present. The first dorsal spine is $\frac{1}{3}$ of the fourth, the longest. In the present the first spine is 2 $\frac{1}{2}$ in the length of the third and fourth, which are of equal length. Single individuals occur at all seasons at Pinang. They are eaten by the natives.

CARANX LEPTOLEPIS, Kuhl. and Van Hasselt.

Caranx leptolepis, Cuv. and Val. IX. 63.

Caranx mertensii, Cuv. and Val. IX. 64.

Head above and back steel blue; from above the orbit to the caudal

a broad gamboge band; the rest of the body shining silvery; dorsal and caudal fins gamboge, the rest white. Iris silvery, blue towards the orbit. In some individuals a large bluish black spot on the upper part of the opercle.

D 8—1/25 or 26, C 17 $\frac{6}{8}$, A 2—1/22 or 23, V 1/5, P 20, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Java, Manilla.

TOTAL LENGTH: 4 $\frac{4}{8}$ inch.

The length of the head is 3 $\frac{1}{3}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is $\frac{1}{6}$ less than the length. The diameter of the orbit, which is surrounded by a very narrow adipose fold, is $\frac{1}{3}$ of the length of the head. The lower margin of the opercle is straight. The snout is uncommonly protractile; the teeth of both jaws are excessively minute, so as to be barely perceptible to the touch. The very slight arch of the lateral line terminates opposite the middle of the second dorsal; the anterior part of the rest is covered by minute scales, which do not perceptibly increase in size till opposite the posterior third of the second dorsal, from whence may be counted 25 such. None of these scales exceed $\frac{1}{16}$ of the greatest vertical diameter of the body, which equals the length of the head. The length of the falcated pectorals also equals that of the head. M. M. Cuvier and Valenciennes describe *C. mertensii* as merely differing by the absence of the black opercular spot. At Pinang, where the fish is uncommon, individuals occur with and without the spot, in forms and colours so exactly like, as to leave no doubt about their identity.

C.—*With trenchant profile, forming a segment of a circle; plates exclusively on the straight portion of the lateral line; pectorals falciform; in front of the first dorsal an immoveable horizontal spine, often hid in the integuments.*

CARANX FORSTERI, Cuv. and Val.?

Scomber hippos, Lin. apud Forster?

Caranx forsteri, Cuv. and Val. IX. 107?

Young. Head above and back golden green, lighter on the sides; rest of the body shining silvery; abdomen with mother-of-pearl reflections; at the angle of the opercle a very faint bluish black spot; first dorsal minutely dotted with brown, so as to appear pale grey; ventrals and

anal white; pectoral, caudal and second dorsal yellowish, the point and margin of the latter, and the posterior margin of the caudal minutely dotted with brown, so as to appear greyish. Iris silvery, bluish black towards the orbit.

D 8— $1/20$ or 21, C $17\frac{2}{7}$, A 2— $1/15$, 16 or 17, V $1/5$, P 19, Br. VII.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $4\frac{2}{8}$ inch.

The length of the head is a little less than $3\frac{1}{3}$ in the total, measured to the centre of the posterior margin of the caudal fin; the depth at occiput equals the length. The diameter of the orbit is $3\frac{1}{4}$ in the length of the head. The infraorbital is longer than broad: its greatest breadth, along the superior margin equalling $\frac{1}{2}$ the diameter of the orbit. The arched, very slightly undulating, portion of the lateral line terminates opposite the fifth or sixth ray of the second dorsal; the straight portion is covered by 30 to 31 plates, none of which exceed about $\frac{1}{8}$ of the greatest diameter of the body, which is $3\frac{1}{4}$ in the total length of the body. The length of the falcated pectorals equals that of the head. Single individuals occur at Pinang at all seasons. They appear nearest to correspond to the description of *C. forsteri*.

CARANX MALABARICUS, (Bloch-Schneider.)

Scomber malabaricus, Bloch-Schn. p. 31.

Russell, CL. Tallam Parah.

Caranx malabaricus, Cuv. and Val. IX. 121.

Caranx malabaricus, Richardson, Report, 1845, 275.

Head above and back pale silvery sea green; sides of the head and body shining silvery with blue reflections; abdomen white; at the upper part of the opercle a bluish black spot; pectorals, second dorsal and caudal yellowish white, the two latter sparingly dotted with black towards the margin; anal and ventrals white; first dorsal hyaline. Iris silvery, minutely dotted with brown; upper orbital margin bluish black.

D 8— $1/22$, C $17\frac{2}{7}$, A 2— $1/18$, V $1/5$, P 20, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Coromandel, Bay of Bengal, Red Sea, China Sea.

TOTAL LENGTH: 8 inch.

The length of the head is $3\frac{1}{3}$ in the total, measured to the centre of

the posterior margin of the caudal; the depth at occiput equals the length. The transversal diameter of the orbit is a little less than $\frac{1}{3}$ of the length of the head. The teeth of both jaws, of the vomer and the palatals are velvety, but those on each side of the symphysis of the jaws are a little longer than the rest. The tongue is very small, linear, and with the exception of the apex, covered with velvety teeth. The arched portion of the slightly undulating lateral line terminates opposite the posterior third of the second dorsal; the straight portion is covered by 35 to 36 plates, none of which exceeds $\frac{1}{20}$ of the greatest vertical diameter of the body, which is about $2\frac{1}{2}$ in the total length. The pectorals equal the length of the head. Single individuals occur at Pinang at all seasons, and are eaten, fresh or dried, by the natives.

CARANX NIGRIPES, Cuv. and Val.

Russell, CLII. Mais Parah.

Caranx nigripes, Cuv. and Val. IX. 122.

Caranx nigripes, Richardson, Report, 1845, 275.

Caranx nigripes, Bleeker: Verh. Batav. Gen. XXII. 4.

Head above and back pale silvery blue or green; sides of the head and body shining silvery with rose coloured reflections; abdomen white: on the upper part of the opercle an indistinct bluish black spot; base and anterior margin of ventrals white, rest greenish black, and between these fins a black spot; first dorsal greyish, minutely dotted with black; the rest of the fins white, the second dorsal and caudal minutely dotted with black towards the margin; at the symphysis of the lower jaw a black spot; branchiostegous rays and membrane silvery white, the latter broadly brimmed with black between the four lower rays. Iris silvery, upper orbital margin bluish black.

D 8—1/21 or 22, C 17 $\frac{5}{6}$, A 2—1/18, 19 or 20, V 1/5, P 19, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Coromandel, Bay of Bengal, Java, Balli, Madura, China Seas.

TOTAL LENGTH: 6 inch.

The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior caudal margin; the depth at occiput exceeds by $\frac{1}{6}$ the length. The transversal diameter of the eye is $3\frac{1}{4}$ in the length of the head. The greatest vertical diameter of the body is $2\frac{1}{8}$ in the total length. The horizontal, immoveable, spine in front of the first

dorsal, is rather strong, with the point free. The arched portion of the lateral line terminates opposite the fifth ray of the second; the straight portion is covered by about 36 or 37 slightly pointed plates, none of which exceeds $\frac{1}{20}$ of the greatest diameter of the body. The length of the falcated pectorals is $3\frac{1}{5}$, that of the ventrals is $4\frac{1}{5}$ in the total. The length of the ventral spine is $2\frac{1}{2}$ in the nearest ray. The point of the second dorsal and anal fin is $3\frac{1}{3}$ in the greatest vertical diameter of the body. Behind the eyes appear some indistinct scales; the cranial crest, the rest of the head and the thorax are scaleless; the rest of the body is covered by small orbicular, somewhat deciduous scales.

This species is at all times excessively numerous in the Straits of Malacca and the Bay of Bengal. The natives eat it in its fresh and dried state.

CARANX ATROPUS, (Bloch-Schneider).

Brama atropus, Bloch-Schneider, 98, Pl. 23.

Olistus atropus, Cuv. and Val. IX. 141.

D 8— $1\frac{1}{21}$, C $17\frac{6}{8}$, A 2— $1\frac{1}{17}$, V $1\frac{1}{5}$, P 19, Br. VII.

HABIT.—*Sea of Pinang*.

Tranquebar.

TOTAL LENGTH: $7\frac{4}{8}$ inch.

In proportions, number of fin rays and colours this fish exactly resembles *Caranx nigripes*, from which it merely differs in having the 6th, 7th, 8th, 9th, 10th, 11th, and 12th rays of the second dorsal longer than the rest, and the elongated part not connected by the membrane. The 8th and 9th are the longest, each being about $2\frac{1}{2}$ in the greatest vertical diameter of the body. All the elongated rays, although filamentous, are distinctly branched, which consequently excludes the fish from the genus *Olisthus*.* The elongated part, as well as the half of the membrane in front of each ray, is minutely dotted with black. However erroneous Bloch's description and figure of *Brama atropus* may be, there seems to be no reason to doubt that a specimen of the present fish was his original. M. M. Cuvier and Valenciennes observe that the specimen now extant, marked by Bloch: *Brama atropus*, (his specimen of *Caranx nigripes* is labeled :

* *OLISTHUS*, Cuv. (R. A. 1829.) Differs from *Caranx*, (*Citula*) in having the middle rays of the second dorsal not branched, but merely articulated, and each elongated into a filament.

Brama melampus,) is nothing but *Caranx nigripes*. Mutilation of the delicate filaments of *C. atropus* would indeed render it indistinguishable from *C. nigripes*. A single individual of the present was observed at Pinang in June, 1844, and it remains to be ascertained if the elongation of some of the dorsal rays is more than an individual distinction. Dr. Rüppell obtained in the Red Sea a specimen of his *Citula ciliaria* (Syn. *Olistus? rupellii*, Cuv. and Val.) which had the middle rays of both the second dorsal and of the anal fin elongated filamentous, and he therefore thinks it possible that the fish is identical with *Olistus malabaricus*, Cuv. and Val. (Neue Wirbelth. Fische: p. 50).

CARANX ARMATUS, (Rüppell.)

Sciæna armata, Forskål, Fauna Arab. p. 53, No. 68?

Sciæna armata, Linné, Syst. 1306?

Russell, CLI. Tchawil Parah. (Young.)

Citula armata, Rüppell: Atlas, 103.

Caranx citula (cirrhosus, Ehrenb.) Cuv. and Val. IX. 126, Pl. 250.

Caranx armatus, Cuv. and Val. IX. 127.

Caranx ciliaris, Cuv. and Val. IX. 129. (Young.)

Citula armata, (Syn. *Caranx cirrhosus*,) Rüppell, Neue Wirb. Fische 50.

Caranx ciliaris, Temm. et. Schl. Fauna Japon. Pisc. 112.

Caranx ciliaris, Richardson, Report, 1845, 276.

Young. Head above and back pale sea green or bluish green; sides of the head and of the body beneath the lateral line mother-of-pearl with pale rose coloured reflections; abdomen white; an indistinct black spot at the upper part of the opercle; first dorsal hyaline minutely dotted with black; second dorsal yellowish white, the elongated point and the upper margin minutely dotted with black; caudal yellowish white, marginal half minutely dotted with black; anal and pectorals white; base and anterior margin of the ventrals white, rest pale greenish grey, minutely dotted with brown. Iris silvery, upper orbital half greenish black.

D 8—1/21, C 17⁵/₅ A 2—1/16 or 17, V 1/5, P 19, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Seas of China and Japan, New Guinea, Java, Coromandel, Red Sea, Indian Ocean.

TOTAL LENGTH : $4\frac{4}{8}$ inch.

The length of the head is $3\frac{2}{3}$ in the total, measured to the centre of the caudal fin ; the depth at occiput exceeds by $\frac{1}{4}$ the length. The diameter of the orbit is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body, in front of the second dorsal, is $2\frac{1}{4}$ in the total length. The arched portion of the lateral line does not abruptly become straight ; it straightens a little in front of and opposite the third posterior part of the second dorsal, and is covered by about 24 plates, none of which exceeds $\frac{1}{3}$ of the greatest vertical diameter of the body. The elongated first dorsal ray exceeds by about $\frac{1}{4}$ the greatest vertical diameter of the body ; the first anal ray scarcely exceeds $\frac{2}{3}$ of the first dorsal, but is frequently less. The point of the horizontal spine, in front of the first dorsal fin, is exposed. The length of the falcated pectorals is $\frac{1}{3}$ of the total length ; the ventrals slightly exceed $\frac{1}{2}$ of the pectorals. This species is of uncommon occurrence at Pinang. It corresponds exactly to Russell's No. CLI. (*Caranx ciliaris*, Cuv. and Val.) which would appear to be the young of *Citula armata*, which Dr. Rüppell considers to be identical with *Caranx citula* (*cirrhusus*, Ehrenb.) Cuv. and Val. The description of the latter affords no specifically distinguishing characters.

CARANX OBLONGUS, Cuv. and Val.

Caranx oblongus, Cuv. and Val. IX.

Young. Head above and back pale yellowish green ; sides of the head and body beneath the lateral line shining silvery ; abdomen white ; first dorsal hyaline, sparingly dotted with brown ; second dorsal and anal hyaline, the marginal half minutely dotted with brown, the elongated points of the fins bright yellow ; ventrals and caudal yellow, the margin of the latter minutely dotted with black ; pectorals white. Iris golden light green ; upper half of orbital margin bluish black.

D 8— $1\frac{1}{22}$, C $17\frac{7}{7}$, A 2— $1\frac{1}{19}$, V $1\frac{1}{5}$, P 21, Br. VII.

HABIT.—*Sea of Pinang.*

Vanicolo, Oualan.

TOTAL LENGTH : $5\frac{3}{8}$ inch.

The length of the head is $\frac{1}{3}$ of the total, measured to the centre of the posterior margin of the caudal ; the depth at occiput slightly exceeds the length of the head, of which the diameter of the orbit is $\frac{1}{3}$.

Of the velvety teeth those of the symphysis of both jaws are somewhat stronger than the rest. The greatest vertical diameter of the body in front of the second dorsal is $2\frac{1}{2}$ in the total length, measured to the centre of the posterior margin of the caudal. The lateral line is slightly arched, following the profile of the back it terminates opposite the second third of the dorsal. The straight portion is covered by 40 strongly keeled plates, none of which exceed $\frac{1}{8}$ of the greatest vertical diameter of the body. The point of the horizontal spine in front of the first dorsal is exposed. The elongated anterior ray of the second dorsal exceeds by $\frac{1}{7}$ the greatest vertical diameter of the body, of which the anterior ray of the anal is but $\frac{2}{3}$. The falcated pectorals equal the lobes of the caudal, and are $2\frac{1}{2}$ in the total length. The ventrals are $\frac{1}{2}$ of the pectorals. A single individual occurred at Pinang in September, 1843.

CARANX SPECIOSUS, (Forskål.)

Scomber speciosus, Forskål, Fauna Arab. 54, No. 70.

Scomber speciosus, Linné, Syst. 1332.

Lacépède, III. Tab. 1, Fig. 1.

Russell, CXLIX. Poloosoo Parah.

Scomber speciosus, Shaw, IV. 603.

Caranx à six bandes, Quoy et Gaim. Tab. 65, Fig. 4.

Caranx speciosus, Rüppell, Atlas, 96.

Caranx speciosus, (Syn. C. petaurista: Isid. Geoff. Eg. Tab. XXV.

Fig. 1. *Adult.*) Cuvier, R. A. II. 209 (')

Caranx speciosus, Cuv. and Val. IX. 130.

Caranx speciosus, Rüppell: Neue Wirbelth. Fische, 45.

Zonichthys subcarinata, Swainson: II. 248.

Caranx speciosus, Bleeker: Verh. Batav. Gen. XXII. 4.

Ground colour citrine or king's-yellow with a bluish black oblique band from the centre of the orbit to the occiput; a second from the occiput vertically over the posterior margin of the opercle; a third narrow line from in front of the first dorsal to a little below the lateral line; a fourth broad band from the middle of the first dorsal to abdomen; a fifth narrow line from between the dorsals; a sixth broad band from the anterior part of the second dorsal; a seventh narrow line from the middle; an eighth broad band from the posterior part;

and a ninth narrow line from the termination of the second dorsal; the posterior three alternate bands and lines reaching the abdomen; in some a bluish black spot at the root of the pectorals; branchiostegous rays and membrane, the two spines in front of the anal and the ventrals white; the rest of the fins citrine, the dorsals minutely dotted with black, the points of the caudal and the posterior margin black. Iris golden citrine, upper orbital margin bluish black.

D 7—1/19 or 20, C 17 $\frac{7}{8}$, A 2—1/15 or 16, V 1/5, P 22, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

New Holland, Vanicolo, Isle of France, Red Sea,
Trincomalie, Coromandel, Java, Madura.

TOTAL LENGTH : 9 inch.

The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput equals the length. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. In individuals not exceeding $3\frac{4}{8}$ inches in length, velvety teeth may be felt on each side on the symphysis of the upper jaw; on each side of the symphysis of the lower they may distinctly be seen, and a single series of from 10 to 12 rather distant teeth appear across the vomer. In an individual 9 inches in length no teeth appeared except a small, yet distinct, one on each side of the symphysis of the lower jaw. The greatest vertical diameter of the body, in front of the second dorsal, is $\frac{1}{3}$ of the total length. The arched portion of the lateral line terminates, but not abruptly so, a little in front of and opposite the middle of the second dorsal fin. The straight portion is covered by upwards of 34 slightly keeled plates, of which none of the posterior 12, the largest, exceeds $\frac{1}{4}$ of the greatest vertical diameter of the body. The length of the falcated pectorals equals that of the head. Single individuals occur at Pinang at all seasons. They are eaten by the natives.

GEN. SCYRIS, *Cuvier*, 1829.

Differs from *Caranx* by a more elevated, trenchant profile; first dorsal entirely hid; second dorsal with some of the rays elongated, filamentous.

SCYRIS INDICUS, Rüppell.

Scyris indicus, Rüppell: Atlas, 128, Tab. 33, Fig. 1. (*Young.*)

Scyris indica, Cuv. and Val. IX. 145, Pl. 252. (*Adult.*)

Scyris indicus, Rüppell: Neue Wirbelth. Fische, 51.

Scyris rüppelli, (*Young*) } Swainson, II. 251.
 Scyris indicus, (*Adult*) }

Scyris indica, Richardson, Report, 1845, 276.

Head above and back blackish silvery; cheeks and opercles shining silvery, the latter minutely and sparingly dotted with brown; at the upper part of the posterior margin of the opercle a small intensely black spot; the rest of the body silvery satin, abdomen sparingly dotted with brown; fin-rays and membranes yellowish white; upper margin of the second dorsal and posterior margin of the caudal minutely dotted, so as to appear blackish; root of the pectoral silvery. Iris silvery, upper orbital half bluish black.

D 1/19, C $17\frac{6}{8}$, A 1/16, V $1\frac{1}{5}$, P 19, Br. VII.

HABIT.—*Sea of Pinang*

Java, Pondicherry, Red Sea, China Seas.

TOTAL LENGTH: 1 foot 9 inch.

The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is but $\frac{1}{3}$ of the total length. The diameter of the orbit is $\frac{1}{4}$ of the length of the head. In both jaws appear two or three series of small, but strong, conical teeth resembling those of some *Sparoidæ*; those on each side of the symphysis are larger than the rest. The vomer presents a few similar, but the small, oblong, tongue is covered with card-like teeth. The greatest vertical diameter of the body, in front of the dorsal fin, is $2\frac{2}{3}$ in the total length. Each of the small scales composing the lateral line has a central longitudinal tube, from the posterior part of which branch off two smaller ones: one upwards and backwards, the other downwards and backwards. The arched, somewhat undulating portion of the line terminates opposite the middle of the dorsal fin. The straight portion consists mostly of small scales, but towards the termination of the dorsal the posterior eleven gradually enlarge and become sharply keeled; the three or four last, although the largest, do not exceed $\frac{1}{2}\frac{1}{2}$ of the greatest vertical diameter of the body. In the adult the cranial crest is very large and arched, like that observed in *Platax arthriticus*, but the posterior part, from opposite the opercle, is not contiguous, but consists of three separate, gradually decreasing, egg-shaped pieces of bone. Behind the last, lie six successive pieces, entirely hid under the integuments, and resting on the interspinals. The ante-

rior undulating dorsal ray is the longest, slightly exceeding the length of the head. This, as well as the three succeeding, gradually decreasing ones, are undivided; the fifth and sixth are branched like the following, but their anterior branch is undivided and slightly elongated. The anterior anal ray equals in length the corresponding dorsal, and is as well as the second undivided. In front of the anal fin lie two small distant spines entirely concealed under the integuments. The length of the falcated pectorals is $\frac{1}{3}$ of the body, not including the caudal; that of the ventrals a little less than $\frac{1}{2}$ of the pectorals. Single individuals are of very rare occurrence at Pinang.

GEN. GALLICHTHYS, *Cuv. and Val.* 1833.

Body high and compressed; profile much elevated; ventrals elongated; caudal furcated; first dorsal fin very low or reduced to a series of short spines; anterior rays of second dorsal and anal excessively elongated.

GALLICHTHYS MAJOR, *Cuv. and Val.*

Russell, LVII. Gurrah Parah.

Gallichthys major, *Cuv. and Val.* IX. 168, Pl. 254.

Blepharis gallichthys, Swainson, II. 250.

Gallichthys major, Richardson, Report, 1845, 271.

Head above and back blackish silvery; cheeks and opercles shining silvery; at the upper part of the latter an indistinct bluish spot; rest of the body silvery satin; fin-rays and membranes yellowish white; elongated portion of the dorsal and anal, upper margin of the dorsal and posterior of the caudal minutely dotted with black; dorsal and anal filaments, and ventral fins black. Iris silvery, upper orbital half bluish black.

D 6—1/18 or 19, C $17\frac{8}{8}$, A 2—1/16, V $1\frac{5}{5}$, P 19, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Coromandel, Moluccas, China Sea.

TOTAL LENGTH: 6 iuch.

The length of the head is $\frac{1}{3}$ of the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is nearly double the length of the head. A narrow band of velvety teeth appears in both jaws and on the vomer. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body is $1\frac{1}{2}$ in the total length. The lateral line in its component scales, and

its course exactly resembles that of *Seyris indicus*. The length of the anterior ray and its hairlike filament, of the second dorsal, anal, and ventral fins equals the length of the body ; it is, however, liable to individual variations. The four anterior rays of the second dorsal are undivided, and as well as the five succeeding branched rays, terminate in gradually decreasing hairlike filaments. The two anterior anal rays are undivided, and as well as the third, which is branched, terminate in similar filaments. The anterior ventral ray is undivided, and, as well as the second, which is branched, filamentous. The length of the falcated pectorals and of the caudal lobes is $2\frac{2}{3}$ in the total. Single individuals are rarely seen at Pinang.

GEN. SERIOLA, (*Risso*,) *Cuvier* 1829.

Two dorsals, no spurious fins; tail without keel or crests; jaws, vomer and palatals with velvety or card-like teeth. Differs from *Caranx* by the not mailed lateral line; from *Lichia* by the membrane uniting the spines of the first dorsal.

SERIOLA BINOTATA, Cuv. and Val.

Seriola binotata, Cuv. and Val. IX. 215.

Head above, back and sides to the lateral line yellowish green; sides of the head and body beneath the lateral line greenish yellow, abdomen bluish white or green; dorsals greenish yellow; a black vertical band above the eye, a second broader from occiput over the opercle; a third from between the second and fourth spine of first dorsal down towards the pectoral; a fourth from the point of second dorsal to the side below the lateral line; a fifth from the middle of the second dorsal to the lateral line; a sixth from the posterior part of the second dorsal; a seventh in front of the upper half of the root of the caudal; between the bands some round and irregular black spots; caudal yellow with a round black spot in the centre and an oval over each lobe, the point of which is yellowish white; anal light bluish green, lower half black, anterior and posterior angle yellowish white; ventrals light bluish green, posterior half black, point of anterior ray yellowish white; pectorals pale yellow. Iris light golden green, orbital margin blackish.

D 7— $1\frac{1}{32}$ or 33, C $17\frac{1}{7}$, A 2— $1\frac{1}{15}$, 16 or 17, V $1\frac{1}{5}$, P 19, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Pondicherry, Bay of Bengal.

TOTAL LENGTH: $4\frac{6}{8}$ inch.

The length of the head is $3\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal; the depth at occiput is a little less than the length of the head. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The forehead between the eyes is arched, not trenchant. The angle of the mouth is opposite the posterior margin of the orbit. The card-like teeth of the jaws, vomer and palatals are rather large, recurvoux; those of the tongue velvety. The greatest vertical diameter of the body, in front of the first dorsal, slightly exceeds the length of the head. No immoveable spine is perceptible in front of the first dorsal fin. The anterior third of the lateral line is a little arched, the rest nearly straight. The first dorsal is small: its height but $\frac{1}{3}$ of the greatest vertical diameter of the body; the point of the second dorsal is more than double the height of the former. The length of the ventrals equals that of the head; the anterior half of the fifth ray is connected to the abdomen by a membrane. The length of the pectorals is $\frac{1}{6}$ of that of the body, the caudal not included. The caudal lobes are $\frac{1}{4}$ of that distance. Single individuals occur rarely at Pinang. This species greatly resembles *Seriola nigrofasciatus* (Rüppell),* from which it, however, may at once be distinguished by the remarkably shorter distance between the first and second dorsal.

GEN. LACTARIUS, Cuv. and Val. 1833.

(PLATYLEPIS, Swainson 1839.)

Differs from *Seriola* in having one or two long arched teeth on each side of the symphysis of the upper jaw; in having a single series of fine teeth in the lower, and on the symphysis one or two longer ones; and in the absence of free spines in front of the anal fin.

LACTARIUS DELICATULUS, Cuv. and Val.

Scomber lactarius. Bl.-Schn. 31, No. 26.

Russell CVIII, Chundawah.

Seriola lactaria, Cuv. R. A. II. 206.

Lactarius delicatulus, Cuv. and Val. IX. 238, Pl. 261.

Platylepis lactaria, Swainson, II. 247.

Lactarius delicatulus, Richardson Report 1845, 272.

Lactarius delicatulus, Bleeker: Verh. Bat. Gen. XXII. 4.

Head above, back and sides to the lateral line greenish grey or lead

* SYN. *Nomeus nigrofasciatus*, Rüppell. Atlas, 82 Pl. 24, Fig. 1.—*Seriola rüppelli*, Cuv. and Val. IX. 216.

coloured ; the rest shining silvery ; a black spot at the upper part of the posterior margin of the opercle ; fins hyaline, marginal half of dorsals and caudal minutely dotted with black. Iris silvery, upper half of orbital margin black.

D 8— $1\frac{21}{21}$ or 22, C $17\frac{7}{7}$, A $3\frac{25}{25}$, 26 or 27, V $1\frac{5}{5}$, P 16, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula Singapore.*

Coromandel, Bay of Bengal, mouths of the Ganges, Malabar, Java, Madura,

TOTAL LENGTH : $4\frac{6}{8}$ inch.

The length of the head is $\frac{1}{3}$ of the total, measured to the centre of the posterior margin of the caudal ; the diameter of the eye is $3\frac{1}{3}$ in the length of the head. The greatest vertical diameter, in front of the first dorsal, equals the length of the head. The lateral line follows at the upper third of the body the outline of the back. The scales of the lateral line and the body are rather large, orbicular, very thin and deciduous. This species is excessively numerous at all seasons. It is eaten both fresh and dried.

GEN. STROMATEUS, (*Artedi*.) *Linné*. 1748.

Ventral fins none ; dorsal single with the spines hid in the anterior margin ; vertical fins covered with scales.

STROMATEUS NIGER, Bloch.

Stromateus paru, Bloch Pl. 160.

Stromateus niger, Bloch Pl. 422.

Stromateus paru, *Linné* : Syst. 1148.

Stromateus paru, Shaw IV. p. 108, (Bloch Pl. 160.)

Stromateus niger, Shaw *ibid*. 111.

Stromateus niger, Russell, p. 35, No. XLIII. Nalla Sandawah.

Stromateus niger, S. paru, Cuv. R. A. II. 213 (*)

Stromateus niger, Cuv. and Val. IX. 385.

Stromateus niger, Cantor : Ann. and Mag. N. H. IX. 15.

Stromateus niger, Richardson Rep. 1845, 272.

Stromateus niger, Bleeker : Verh. Bat. Gen. XXII. 4.

Bawar or Bawal tumbak of the Malays.

Head above, back and sides dark greyish brown with blue reflections ; cheeks, opercles and abdomen silvery light bluish grey or pale neutral tint ; dorsal and anal silvery bluish grey, blackish towards the

margin ; pectorals and caudal yellowish light grey, edged with blackish. Iris silvery blackish or brownish blue.

D $1/42$ or 43, C $17\frac{7}{8}$, A $1/37$ or 38, P 23, Br. VI. (VII ?)

HABIT.—*Sea of Malayan Peninsula and Islands.*

Chusan, Macao Coromandel, Bay of Bengal, Bombay,
Java, Celebes, Madura.

TOTAL LENGTH : 1 foot.

The length of the head is $3\frac{2}{3}$ in the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is $\frac{1}{4}$ of the length of the head. In each jaw appears a single series of excessively minute teeth. The greatest vertical diameter of the body, from the middle of the point of the dorsal to the anal, is a little less than $\frac{1}{2}$ of the total length. The lateral line, at the upper third of the body, follows the outline of the back to a little in front of the dorsal, from whence it proceeds straight to the caudal. It is raised, like a thin cord ; the tail is distinctly keeled. The dorsal fin is preceded by four or five, the anal by four short spines, which, however, are completely hid by the integuments. The length of the falcated pectorals is a little more than $2\frac{1}{2}$ in the total. The lobes of the caudal equal the length of the head. This species, "*the black pomfret*," is at all seasons taken in abundance in the Straits of Malacca, where, however, it is considered inferior to *Stromateus sinensis*, "*the white pomfret*." In dried state it is largely exported, and thus it appears in the bazaars of Hindustan, which are chiefly supplied from Bombay.

STROMATEUS SINENSIS, Euphrasén.

Stromateus sinensis Euphrasén : Act. Acad. Stockh. IX. 49, Tab. 9.

Stromateus atoo-koia, Russell, p. 35. No. XLIV. Atoo Koia.

Stromateus albus, Cuv. R. A. II. 213 (2)

Stromateus albus, Cuv. and Val. IX. 388.

Stromateus atous, Cuv. and Val. l. c. 389.

Stromateus albus, Cantor, Ann. Nat. Hist. IX. 15.

Stromateus atous, Richardson Report 1845, 273.

Bawar or Bawal chirmin of the Malays.

Young. Head above and back reddish brown ; rest of the body and fins lighter, silvery, with a mixture of ventral tint, lilac or blue ; dorsal, anal, and caudal with the marginal half blackish ; everywhere with

brown dots of different sizes : the larger with a silvery point in the centre.

Adult. Head above, back and sides to the lateral line deep neutral tint; rest of the body with a mixture of brownish grey with metallic reflection, lighter, silvery towards abdomen; everywhere dotted as the young; large patches of milkwhite naked skin, where the scales have disappeared; fins silvery grey, marginal half blackish; cavity of the mouth and tongue pale bluish grey with brown dots, silvery in the centre. Iris reddish silvery or copper-coloured, minutely dotted with brown.

D $1/43$ to 46, C $17\frac{7}{7}$, A $1/39$ to 42, P 26 or 27, Br. VI.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Coromandel, Bay of Bengal, Macao, Chusan.

TOTAL LENGTH : 10 inch.

The length of the head is $4\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is a little less than $\frac{1}{5}$ of the length of the head. The lower jaw projects a little beyond the upper : in both appears a single close series of excessively minute teeth. The thread-like lateral line, at the upper fifth of the body, follows the outline of the back to the termination of the dorsal fin, from whence it proceeds straight, along the upper third of the tail to the caudal. The scales of the body are small, orbicular and so deciduous that the fish generally appears with large patches of milkwhite naked skin. The greatest vertical diameter of the body, from the middle of the point of the dorsal to that of the anal fin, exceeds by $\frac{1}{3}$ half the total length. The pectorals are broad, pointed but not falcated, and project from the body; their length is $3\frac{1}{2}$ in the total. The length of the broad triangular caudal lobes equals that of the head. Both the dorsal and anal fin are preceded by four spines completely hidden by the integuments. As in *Stromateus fiatola*, Linné, and in *S. argenteus*, Bloch, the fleshy oesophagus is armed with numerous bony, barbed, spines or teeth. In the stomach of those examined appeared remains of fishes. This is par excellence the “white pomfret” of the Straits Settlements and Madras, “*pample blanche*” of Pondicherry. It is justly renowned for its flavour, but it requires to be freshly taken when used. In the Straits and on the Coromandel Coast it is abundant at all seasons. At the Sandheads in the Bay of Bengal, (21° N. L.) it occurs, but less numerously. Russell happened seldom

to see this species and considered it very inferior to the "black" (*Stromateus niger*, Bloch) or "white pomfret," by which latter Russell means *Stromateus argenteus*, Bloch. (Russell p. 34.)

STROMATEUS ARGENTUS, Bloch.

Stromateus argenteus, Bloch, Pl. 421.

Stromateus argenteus, Shaw IV. 110.

Stromateus argenteus, Russell p. 31, 35, No. XLII. Tella Sandawa.

Stromateus candidus, Cuv. R. A. II. 213 (?)

Stromateus candidus, Cuv. and Val. IX. 391.

Stromateus argenteus, Cuv. and Val. IX. 393.

Stromateus securifer, Cuv. and Val. IX. 394, Pl. 273 (*Young.*)

Stromateus candidus, Bélanger, 369, Pl. II. Fig. 2.

Stromateus securifer, Cantor Ann. Nat. Hist. IX. 15.

Stromateus securifer, Richardson Report 1845, 273.

Stromateus candidus, Bleeker : Verh. Bat. Gen. XXII. 4.

Head above back and sides to the lateral line neutral tint with purple reflections ; sides of the head and body beneath the lateral line silvery grey, everywhere with minute black dots, disposed on the sides of the occiput, and the upper half of the body so as to produce alternate indistinct, blackish and silvery grey-undulating, irregular lines ; on the upper part of the opercle an irregular black spot ; abdomen silvery white ; dorsal and anal silvery, minutely dotted with black so as to render the point and marginal half blackish ; caudal and pectorals yellowish white, minutely dotted with black so as to make the posterior half and the margins blackish ; cavity of the mouth and tongue as in *S. sinensis*. Iris silvery, minutely dotted with black.

D 9—1/39 to 43, C 17 $\frac{2}{7}$, A 6—1/34 to 38, P. 25, Br. VI.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Malabar, Coromandel, Bay of Bengal, Macao, Chusan,
Java, Madura.

TOTAL LENGTH : 9 inch.

The length of the head is 4 $\frac{1}{2}$ in the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is 3 $\frac{1}{2}$ in the length of the head. The muzzle is a rounded protuberance which considerably projects beyond the mouth. Both jaws have a single close series of excessively minute teeth. The naked skin of the upper

part of the head and the anterior part of the back is longitudinally wrinkled. The lateral line follows a similar course to that of *S. chinensis*, and the scales of the body are equally deciduous. The points of the dorsal and anal are more falcated and as well as the lobes of the caudal and the pectorals more elongated than in the former species. The length of the point of the anal, slightly exceeding that of the dorsal, equals the pointed pectorals which as well as the caudal lobes are $\frac{1}{3}$ of the total length. The greatest vertical diameter of the body between the commencement of the dorsal and anal fin, exceeds by $\frac{1}{4}$ half the total length. The dorsal fin is preceded by nine truncated processes of which each has one forwards and one backwards directed spine; the anal is preceded by six similar ones, differing, however, in having the longer spine pointing backwards. In young individuals these spines are much more distinct than in the adult, and in this stage the fish has been described as *Stromateus securifer*.—*Stromateus argenteus*, Euphrasén,—*Stromateus aculeatus*, Bloch-Schneider, is probably also the young of this species. In the adult fish the anterior two or three of the truncated dorsal processes are completely hidden by the integuments, and the rest are barely piercing the back, so as to be more readily felt than seen. Although they escaped the observation of Bloch, Russell correctly identified his No. XLII. *Tella Sandawa*, with Bloch's Pl. 421. In the Straits Settlements as well as at Madras, also this species is denominated the "*white pomfret*." In abundance and excellence it vies with *S. sinensis*.

STROMATEUS CINEREUS, Bloch.

Stromateus cinereus, Bloch Pl. 420.

Stromateus cinereus, Shaw IV. 109.

Russell XLV. Sudi Sandawah.

Stromateus sudi,
Stromateus cinereus, } Russell p. 35.

Stromateus griseus, Cuv. R. A. II. 213 (²)

Stromateus griseus, Cuv. and Val. IX. 395.

Head above, back and sides to the lateral line lead grey; cheeks and opercles silvery, slightly dotted with black; an irregular black spot on the upper part of the opercle; sides beneath the lateral line silvery grey; abdomen silvery white; dorsal and anal silvery grey, minutely dotted with black; their elongated points and margins blackish; caudal

yellowish white, minutely dotted with black, margins and posterior part of the lobes blackish; pectorals buff, upper margin and posterior half minutely dotted with black; cavity of the mouth and tongue as in *S. sinensis*. Iris silvery, orbital half lead grey.

D 7 or 8— $1/39$ to 41, C $17\frac{2}{7}$, A 5— $1/32$ to 39, P 23 to 25, Br. VI.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Coromandel, Bay of Bengal.

Length of the body,	4 inch.
„ of the lower caudal lobe,	4 „

TOTAL LENGTH: 8 inch.

The length of the head is $\frac{1}{4}$ of the total, measured to the centre of the posterior margin of the caudal. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The muzzle forms a large rounded protuberance projecting over the mouth. Each jaw has a close series of excessively minute teeth. The lateral line is situated as in *S. sinensis* and *argenteus*. The scales of the body are small, orbicular and so deciduous that the fish generally appears scaleless. The truncated processes preceding the dorsal and anal fin resemble those of *S. argenteus*, from which the present may readily be distinguished by the far greater elongation of the lower lobe of the caudal, and of the falcated point of the anal fin. The falcated point of the dorsal equals the length of the pointed pectorals, which are $2\frac{2}{3}$ in the total length. The upper caudal lobe is but $\frac{1}{2}$ of the lower, which equals the length of the body, the caudal not included. The length of the falcated point of the anal fin in some individuals equals the lower caudal lobe, in others it is but $\frac{2}{3}$ of the latter. The greatest vertical diameter of the body, between the commencement of the dorsal and anal fin, exceeds by $\frac{1}{3}$ half the total length. At Pinang this species is as abundant as the preceding, but probably from its inferior size it is considered somewhat inferior in quality. At the Sandheads it occurs rarely.

GEN. CYRTUS, Bloch 1787.

Body compressed; back greatly elevated with several small trenchant blades in front of the dorsal; between the ventrals on the pelvis a horizontal, backwards directed spine; scales excessively minute, transparent; ribs dilated, convex, forming rings in contact with each other and producing a conical cavity.

CYRTUS INDICUS, Bloch.

Kurtus indicus, Bloch Pl. 169.

Kurtus indicus, Linné, Syst. 1184.

Kurtus blochii, Lacép, II. 516 and 517. } (Female ?)

Kurtus indicus, Shaw IV. 185, Pl. 25. }

Russell XLVIII. Somdrum Kara Mooddee. (Male ?)

Kurtus indicus, Cuv. R. A. II. 215. (Female ?)

Kurtus cornutus, Cuv. l. c. (Male ?)

Kurtus blochii, Cuv. and Val. IX. 421, Pl. 277. (Female ?)

Kurtus cornutus, Cuv. and Val. IX. 426. (Male ?)

Kurtus blochii, Swainson II. 253.

Kurtus blochii, Bleeker : Verh. Bat. Gen. XXII. 4.

Head above and body flesh-coloured, hemitransparent ; back minutely and closely dotted with black, forming immediately behind the occiput a large rounded spot, from which in some (the males ?) projects the black, downwards arched, horn-like process ; opercles and jaws silvery, with steel blue reflections ; abdomen silvery with rose-coloured, lilac and golden reflections ; pectorals and ventrals whitish, the rest of the fins pale reddish or whitish yellow, minutely dotted with black. Iris silvery, upper orbital margin blackish.

D 8—2/13, C 17 $\frac{5}{6}$, A 2/33 or 34, V 1/5, P 23, Br. VII.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Java, Madura, Coromandel, Sandheads.

TOTAL LENGTH : 5 inch.

The length of the head in a straight line from the symphysis of the lower jaw, is $\frac{1}{4}$ of the total, measured to the centre of the posterior margin of the caudal, but taken obliquely upwards to the membranous angle of the opercle, it is but $\frac{1}{4}$ of the total, and equals the depth at occiput. The diameter of the eye is $\frac{1}{4}$ of the former length of the head. In each jaw is a band of card-like teeth : in the upper immediately under the symphysis is a naked excavated space, which receives from the lower a corresponding protuberance, covered with teeth ; on the vomer and the palatals appears a single series of excessively minute velvety teeth. On the inferior margin of the preopercle appear three strong backwards arched spines, of which the posterior is the longest and somewhat removed from the others. The angle of the opercle projects

far back, and is excessively thin, membranous, supported by four or five backwards radiating rays, the points of which are exposed. In those, supposed by Cuvier to be males, projects immediately behind the occiput a horn-like, compressed process, broad at the base, somewhat attenuated, but truncated at the apex. It is arched, placed horizontally, with the apex bent downwards. On the upper margin, close to the apex appear four minute spines. The two first dorsal spiny processes immediately behind the horn-like one, are very minute, triangular, with the point directed backwards; the third is truncated with a minute spine in front and behind; the fourth is much larger and consists of a forwards directed spine; the succeeding four spines gradually increase and are all directed backwards. The dorsal fin is preceded by two spines of which the anterior is $\frac{1}{2}$ of the second, which again is $\frac{1}{2}$ of the length of the first ray. The greatest vertical diameter of the body, in front of the first dorsal ray, is $\frac{1}{3}$ of the total length. Each of the broad, excavated ribs, from the third to the fifteenth vertebra, serves to form a conical, funnel-shaped cavity, very pointed towards the tail. The broad truncated lower extremity of each rib is striated, so as to appear as if fringed. The stomach is a rounded, rather capacious sac, generally expanded by remains of *Crustacea*; the liver is small, divided in two lobes; the gall bladder and the spleen excessively minute. The narrow intestinal canal forms two circumvolutions: its length is about $\frac{2}{9}$ of the length of the fish. In the Straits of Malacca and the Bay of Bengal as far as the mouths of the Ganges, it is excessively numerous at all seasons. Individuals with the horn-like process are far less numerous than those without it. Large quantities are dried, and consumed by the natives of India. Plate 277 of Cuvier and Valenciennes represents the fish much too red.

GEN. EQUULA, Cuvier 1817.

Body compressed; dorsal undivided; snout greatly protractile; edges of back and abdomen dentated along the fins.

EQUULA CABALLA, Cuv. and Val.

Scomber equula, Forskål, Faun. Arab, 58, No. 77.

Centrogaster equula, Linné: Syst. 1337.

Cæsius poulain, Lacép. III. 90.

Russell LXII. Tottah Karah?

Scomber equula, Shaw, IV. 596.

Equula caballa, Cuv. and Val. X. 73.

Equula caballa, Rüppell: Neue Wirbelth. Fische, 51.

Equula caballa, Bleeker: Verh. Bat. Gen. XXII. 5.

Head above and back silvery pale green, minutely dotted with black; the rest of the head and body shining silvery; muzzle above greenish grey, minutely dotted with black; dorsal and anal spines pale silvery iridescent, and as well as their membranes sparingly dotted with black; the base of the dorsal and anal membrane pale reddish yellow, the rest hyaline, the margin of the dorsal blackish; caudal yellowish white, minutely dotted with black, so as to render the posterior margin blackish; ventrals white, reddish yellow at the base and with a few black dots; pectorals hyaline, blackish silvery outside along the root, on the innerside and in axilla black. Iris silvery, orbital half blackish.

D 8/16 or 7/17, C 17 $\frac{1}{7}$, A 3/14 or 15, V 1/5, P 18 or 19, Br. V.

HABIT.—*Sea of Pinang, Singapore.*

Red Sea, Bombay, Malabar, Guam, Coromandel, Java,
Sumbawa, Madura.

TOTAL LENGTH: 6 inch.

The length of the head is $3\frac{2}{3}$ in the total, to the centre of the caudal margin; but with the muzzle protracted it slightly exceeds $\frac{1}{3}$ of the total. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The narrow band of fine flexible teeth in the jaws, is almost hid by the fleshy lips. The lower part of the protracted muzzle is considerably arched downwards. The greatest vertical diameter of the body, in front of the dorsal fin, is $\frac{1}{2}$ of the total length. The second dorsal spine is broad, sabre-like, with a sharp edge, and on each side with a narrow longitudinal furrow. The second anal is shorter, but of the same shape. The anterior margin of the third and fourth dorsal, and of the third anal spine is toothed like a saw. Both the dorsal, anal, and ventral spines have the posterior margin transversely striated, a structure also observed in some species of the Genera *Apogon*, Lacép. and *Chanda*, Buchan, Ham. The succeeding species of *Equula* present the same structure of these organs. The length of the second dorsal spine equals that of the head, or $\frac{1}{2}$ of the greatest vertical diameter of the body; the third dorsal is $\frac{1}{3}$ shorter than the second. The second anal spine is even broader than the second dorsal,

but shorter, its length but slightly exceeding that of the third dorsal. The third anal is $\frac{2}{3}$ of the second. In *Equula edentula* (Bloch) (Syn. *Scomber edentulus*, Bloch.—*E. ensifera*, Cuv. and Val.) the two spines are of nearly equal length. At Pinang single individuals are of rare occurrence.

EQUULA BINDUS, Cuv. and Val.

Russell LXIV. Bindoo Karah.

Equula bindus, Cuv. and Val. X. 78.

Young. Head above and back silvery pale green, minutely dotted with black, so as to form a blackish line along the base of the dorsal; rest of the body shining silvery; upper part of opercle steel blue; dorsal fin hyaline, edged with black, upper third of the second, third, fourth and fifth dorsal spines bright orange; caudal pale yellowish, minutely dotted with black, posterior margin blackish; anterior third of anal bright yellow, the rest hyaline; ventrals and pectorals whitish; inside of the mouth and gill-covers dotted with black. Iris silvery, orbital half blackish.

D 8 $\frac{1}{16}$, C 17 $\frac{7}{8}$, A 3 $\frac{1}{4}$, V 1 $\frac{1}{5}$, P 15, Br. V.

HABIT.—*Sea of Pinang.*

Coromandel.

TOTAL LENGTH: 3 inch.

The length of the head is 3 $\frac{1}{3}$ in the total to the centre of the caudal margin; when the muzzle is protracted, it is $\frac{1}{3}$. The latter projects horizontally, forming a short truncated cone. In both jaws appear a single series of excessively fine setaceous teeth. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The two small spines above the anterior part of each orbit are strongly marked. The upper margin of the orbit is very finely toothed, but all the cranial crests are smooth. Russell's remark, that the back before the dorsal fin feels serrated to the finger, must therefore refer to the upper margin of the orbit. Between the interparietal crest and the first dorsal spine appears a smaller interspinal crest, the apex of which, however, does not in this more than in the other species penetrate the integuments. The greatest vertical diameter of the body, in front of the dorsal fin, is $\frac{1}{2}$ of the total length. The second dorsal spine is $\frac{1}{7}$ of the latter, or $\frac{2}{3}$ of the greatest vertical diameter; the third dorsal spine is but little

shorter. The second anal spine equals in length the second dorsal, but it is a little less broad; the third anal is $\frac{3}{4}$ of the second. The ventral fins are remarkably short; their length equals the diameter of the eye; their spine is distinct, but slender. A single individual was observed at Pinang in April 1844.

EQUULA SPLENDENS, Cuvier.

Russell LXI. Goomorah Karah.

Equula splendens, Cuvier R. A. II. 212 (').

Equula gomorah, Cuv. and Val. X. 80.

Equula gomora, Rüppell, Neue Wirb. Fische, 51.

Head above and back pale golden green, minutely dotted with black, forming a blackish line along the base of the dorsal fin; rest of the body silvery satin; the muzzle minutely dotted with black; a little above the lateral line an arched pale reddish line joining the posterior third of the lateral, which itself above borders a broad longitudinal pale reddish band; cheeks and opercles shining silvery; membrane of dorsal hyaline, the upper half between the second and sixth spine black; the rest edged with black; caudal pale reddish yellow, minutely dotted with black; anal pale reddish yellow; ventrals and pectorals white. Iris silvery, orbital margin black.

D 8/16, C $17\frac{1}{7}$, A $3/14$, V $1/5$, P 19, Br. V.

HABIT.—*Sea of Pinang.*

Coromandel, Malabar, Red Sea.

TOTAL LENGTH: 4 inch.

The length of the head is $3\frac{2}{3}$ in the total to the centre of the caudal margin; with the muzzle protracted, it is $3\frac{1}{6}$. The latter projects very slightly downwards, forming a short truncated cone. The lips are rather fleshy and hide the single series of fine setaceous teeth. The diameter of the eye is a little more than $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body, in front of the dorsal, is $2\frac{1}{3}$ in the total length. The second dorsal spine is $\frac{1}{5}$ of the total length, a little less than $\frac{1}{2}$ of the greatest vertical diameter; the third dorsal is but little shorter. The second anal spine is $\frac{2}{3}$ of the second dorsal; the third anal slightly shorter than the second. Single individuals occur, but rarely, at Pinang.

EQUULA DAURA, Cuvier.

Russell LXV. Dacer Karah.

Equula daura, Cuvier R. A. II. 212, (').

Equula dacer, Cuv. and Val. X. 83.

Young. Head above and back light greenish grey, minutely dotted with black, forming a black line along the base of the dorsal; rest of the body silvery satin; between the occiput and dorsal fin a large triangular blackish spot, not descending to the lateral line; from the posterior angle of the opercle to the caudal a pale yellowish longitudinal band; cheeks and opercles shining silvery, infraorbitals blackish; dorsal hyaline, upper half between the second and sixth spine blackish; caudal yellowish white, minutely dotted with black; anal and pectorals hyaline; ventrals white. Iris silvery, orbital half black.

D 8/16, C $17\frac{1}{7}$, A $3/15$, V $1/5$, P 19, Br. V.

HABIT.—*Sea of Pinang.*

Coromandel, Ceylon.

TOTAL LENGTH: $2\frac{5}{8}$ inch.

The length of the head is $3\frac{3}{4}$ in the total to the centre of the caudal margin; when the conical, slightly downwards arched muzzle is protracted, it is $3\frac{1}{2}$. The diameter of the eye is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body is little less than $\frac{1}{3}$ of the total length. The second dorsal spine is $4\frac{2}{3}$ in the total length; the third is but little shorter; the second anal is $\frac{3}{4}$ of the second dorsal; the third anal is $\frac{2}{3}$ of the second. Single individuals occur occasionally at Pinang.

EQUULA FILIGERA, Cuv. and Val.

Cuvier: Mem. du Mus. I. 402, Pl. 23, Fig. 1.

Equula filigera, Cuv. and Val. X. 92, Pl. 284.

Equula filigera, Swainson II. 250.

Head above and back pale greyish green, minutely dotted with brown; rest of the head and body shining silvery; fins yellowish white; dorsal spines and their membranes, and the muzzle dotted with pale brown. Iris silvery, orbital margin blackish.

D 8/16, C $17\frac{1}{7}$, A $3/14$, V $1/5$, P 19, Br. V.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Moluccas, Seychelles, Malabar, Ceylon.

TOTAL LENGTH: 5 inch.

The length of the head is $3\frac{1}{3}$ in the total to the centre of the caudal margin; with the protracted downwards arched muzzle it is $\frac{1}{3}$. The diameter of the eye is $3\frac{1}{3}$ in the length of the head. The fleshy lips entirely cover the narrow bands of setaceous teeth. The greatest vertical diameter, in front of the dorsal fin, slightly exceeds $\frac{1}{2}$ of the total length. The second, slender, flexible dorsal spine is by $\frac{1}{7}$ less than the greatest vertical diameter of the body; the third is about $\frac{1}{3}$ of the length of the second anal; it slightly exceeds $\frac{1}{2}$ of the second dorsal, and is of equal breadth; the third anal is $\frac{2}{3}$ of the second. This species occurs, but not numerous, at all seasons at Pinang.

EQUULA INSIDIATRIX, (Bloch).

Zeus insidiator, Bloch, Pl. 192, Fig. 2.

Zeus insidiator, Linné, Syst. 1221.

Zée rusé, Lacép. IV. 575.

Zeus insidiator, Shaw IV. 284. Pl. 41.

Equula insidiatrix, Cuv. R. A. II. 212 (?).

Equula insidiatrix, Cuv. and Val. X. 98.

Equula insidiatrix, Bleeker: Verh. Bat. Gen. XXII. 5.

Head above and back metallic violet, paler on the sides towards the lateral line; rest of the head and body shining silvery; head and back minutely dotted with black, forming a blackish line along the base of the dorsal; along the upper part of the sides nine or ten pale reddish brown vertical bands, each consisting of three or four round or irregular spots, descending a little beneath the lateral line; in some individuals a blackish spot on the upper part of the opercle; from the lower part of the orbit along the anterior margin of the cheek an oblique black line, bordered behind by a sulphur-coloured one; fins hyaline; caudal minutely dotted, dorsal edged with black; cavity of the mouth minutely dotted with black; internal surface of opercles sulphur-coloured, partially dotted with black. Iris silvery, orbital margin black.

D 8/16, C 17 $\frac{2}{3}$, A 3/14, V 1/5., Br. IV?

HABIT.—*Sea of Malayan Peninsula and Islands.*

Surat, Coromandel, Malabar, Bay of Bengal, Mouths of the Ganges, Java, Madura.

TOTAL LENGTH: $3\frac{2}{3}$ inch.

The length of the head is $\frac{1}{4}$ of the total to the centre of the poste-

rior margin of the caudal; when the slightly upwards directed tubular mouth is protracted, it is $\frac{1}{3}$ of the total. The lower margin of the preopercle, particularly the anterior part, is finely yet distinctly toothed. The diameter of the eye is $2\frac{1}{2}$ in the length of the head. The greatest vertical diameter of the body, in front of the dorsal, is a little less than $\frac{1}{2}$ of the total length. The second dorsal spine is $\frac{1}{3}$ of the greatest vertical diameter of the body. The second anal spine is $\frac{2}{3}$ of the second dorsal; the third anal is $\frac{1}{2}$ of the second, but much slenderer. The ventrals are very short, their length somewhat less than the diameter of the eye. The branchiostegous membrane appears to have a fifth excessively minute ray. This species is at all seasons very abundant in the Straits of Malacca, and numbers are dried and consumed by the natives.

EQUULA LONGIMANA, Cantor.

Head above and back lead coloured, minutely dotted with black along the dorsal fin; rest of the head and body shining silvery, slightly iridescent; where the opercle and preopercle join above appears a pale blackish spot; on the anterior part of the side between the commencement of the dorsal and the anterior third of the pectoral, a large rounded bluish black spot; fins hyaline; upper half of dorsal membrane, between the third and eighth spine, indistinctly spotted with pale brown. Iris silvery, orbital half black.

D 10/15, C $17\frac{7}{8}$, A 4/13, V $1\frac{5}{8}$, P 13, Br. V.

HABIT.—*Sea of Malayan Peninsula and Islands.*

TOTAL LENGTH: $4\frac{4}{8}$ inch.

The general form of the fish is elongated oblong, the greatest vertical diameter of the body, in front of the dorsal fin, being $\frac{1}{3}$ of the total length, measured to the centre of the posterior margin of the caudal. The length of the head is $3\frac{1}{3}$ in that distance; when the very little downwards protractile mouth is extended, it is $\frac{1}{3}$. The cranial crests are short and less sharp than in the preceding species. No spines appear above the anterior part of the orbit. The diameter of the eye is $2\frac{1}{2}$ in the length of the head. The lips are fleshy, covering a narrow band of minute, recurvous, setaceous teeth, of which there are fewer in the lower than in the upper jaw. The opercle terminates behind in a very obtuse, membranous angle; it is joined to the subopercle by an oblique line; by a vertical to the preopercle. The latter

is triangular, with the posterior part very thin ; the posterior margin is smooth, not toothed, its ascending portion is vertical, the lower rounded, nearly horizontal ; the anterior margin is thick, forming a broad, oblique line. The interopercle fits closely so as to cover the branchiostegous membrane ; its lower margin is convex. The infraorbitals are completely hid. The cheeks, as well as the rest of the head are covered with scales like those of the body, but the opercles have a scaleless appearance. The indistinct lateral line follows the outline of the back along the upper third of the body. It appears during life to be naked ; it is, however, covered with large rounded, diaphanous scales. They are deciduous, and the vertical diameter of the part exposed exceeds three to four times the horizontal. All the spines of the fins are finely transversely striated, but not toothed, and, except the second anal, remarkably slender, transparent. The first dorsal spine is excessively minute ; the second is $\frac{1}{3}$ of the third, the length of which slightly exceeds $\frac{1}{2}$ of the greatest vertical diameter of the body ; the fourth and fifth are but little shorter. The second anal spine is $\frac{3}{4}$ of the second dorsal, but much broader, sabre-like ; the third anal is $\frac{3}{4}$ of the second. The pectorals differ from those of all the other species by being very elongated and falcated ; they extend as far back as the posterior third of the dorsal fin ; their length is $\frac{1}{3}$ of the total. The ventrals are less than $\frac{1}{3}$ of the pectorals. The caudal lobes equal the length of the head. The series of spines along the base of the dorsal and anal fin are very small. In the Straits of Malacca this species is very abundant at all seasons, and quantities, both fresh and dried, are consumed by the natives.

GEN. GAZZA, *Rüppell* 1835.

Body compressed, with very minute scales ; mouth moderate, greatly protractile, with a single series of crooked teeth among which a few longer and stronger than the rest ; no teeth on the palatals nor vomer ; preopercle with a double margin ; the lower part of the external margin serrated ; otherwise resembling *Equula*, but the series of spines along the base of the dorsal and anal fins may be felt, not seen.

GAZZA EQUULAEFORMIS, *Rüppell*.

Gazza equulaeformis, *Rüppell* : Neue Wirbelth. Fische, 4, Tab. 1,
Fig. 3.

Head above and back pale lead coloured, minutely dotted with black ;

rest of head and body shining silvery ; muzzle and upper lip minutely dotted with black, the cheeks with pale blue ; palate, floor of the mouth and internal surface of branchiostegous membrane minutely dotted with black ; dorsal and anal spines pale steel blue ; fin-membranes hyaline ; dorsal between the second and sixth spine minutely dotted with black, superior margin black ; posterior half of caudal minutely dotted with black. Iris silvery, orbital margin black.

D 8/16, C 17 $\frac{1}{7}$, A 3/14, V 1/5, P 16 or 17, Br. V.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Massaua (Red Sea.)

TOTAL LENGTH : 4 inch.

The length of the head is $3\frac{1}{3}$ in the total to the centre of the posterior margin of the caudal ; with the mouth protracted it is $\frac{1}{3}$. The diameter of the eye is $\frac{1}{3}$ of the length of the head. Above the anterior part of the orbit appear two minute spines, and behind them the whole of the upper margin of the orbit is very finely toothed. The greatest vertical diameter of the body, in front of the dorsal fin, slightly exceeds $2\frac{1}{2}$ in the total length. The second dorsal spine is $2\frac{1}{3}$ in the greatest vertical diameter ; the second anal is $\frac{3}{4}$ of the length of the second dorsal ; third anal is but slightly shorter than the second. The superior branchiostegous ray is closely adhering to the gill-cover ; the inferior, (the fifth,) is farther removed from the fourth than the other four are among themselves. In the Straits of Malacca this species is very numerous at all seasons, and forms like the rest an article of food.

GEN. MENE, *Lacépède* 1803.

Mouth like that of *Equula*, but body more compressed ; margin of abdomen trenchant, very convex owing to the development of the scapular and pelvic bones, throwing the ventrals farther back than the pectorals ; profile of the back nearly horizontal.

MENE MACULATA, (Bloch-Schneider.)

Zeus maculatus, Bloch-Schneider, 479, 480, Pl. 14, Fig. 2.

Mene anne-caroline, Lacép. V. 95, No. 6, Pl. 22.

Russell LX. *Ambata Kuttee*.

Mene maculata, Cuv. and Val. X. 104, Pl. 285.

Mene maculata, Swainson II. 251.

Mene maculata, Temm. Schl. Fauna Japon. Pisc. 127, Pl. LXVII.

Fig. 3.

Mene maculata, Richardson, Report 1845, 276.

Head above and back greenish lead coloured, paler on the sides towards the lateral line; rest of the body silvery satin; above the lateral line one or two longitudinal series of more or less distinct, rounded, lead coloured spots; beneath the lateral line two similar series; jaws, cheeks and opercles shining silvery; dorsal pale olive greyish, minutely dotted with black; caudal silvery at the base, rest yellowish white, minutely dotted with black; anal silvery white; ventrals white; first, elongated ray, silvery at the base, rest blackish; pectorals hyaline; lips blackish; tongue, and internal surface of the mouth dotted with black. Iris silvery, orbital margin blackish.

D 4/43, C $17\frac{5}{5}$, A 31, V $1\frac{1}{5}$, P 16, Br. VII.

HABIT.—*Sea of Pinang.*

Java, Coromandel, Japan.

TOTAL LENGTH: 5 inch.

The length of the head is $3\frac{1}{3}$ in the total to the centre of the posterior margin of the caudal, with the muzzle protracted it is $2\frac{3}{4}$. The diameter of the eye is $3\frac{1}{2}$ in the length of the head. The teeth are excessively minute, velvety: in the upper jaw their narrow linear band suddenly widens towards the angle of the mouth. In the space between the interparietal and the interspinal crest, in front of the dorsal fin, appear in succession three small flattened, lancet-shaped ossicles. The greatest vertical diameter of the body, in front of the dorsal fin, is a little less than $\frac{2}{3}$ of the total length. In a solitary individual, observed in August 1845 at Pinang, the lateral line presents the following appearance. The short anterior part, consisting of three rather large tubes, rises nearly vertically, when it turns backwards under a nearly right angle, and proceeds very close to the back towards the origin of the dorsal, where it suddenly disappears. A similar line, but formed of much smaller tubes, commences on the upper fifth of the back, opposite the eighth dorsal ray, and proceeds, deviating a little obliquely upwards, to the thirty-first dorsal ray, where it suddenly terminates. The length of the first ventral ray is $2\frac{1}{2}$ in the total length. The pectoral rays are remarkably broad, compressed, particularly the second which resembles the blade of a sabre.

FAM. CHÆTODONTIDÆ.

GEN. CHÆTODON, (*Artedi*) Linné 1748.

Teeth of the jaws slender, flexible and close like the hairs of a brush; mouth very small, slightly or not at all projecting; body elliptical or nearly orbicular; caudal fin truncated; 12 or 13 dorsal, 3 anal spines; dorsal spines and rays continued in a nearly uniform curve; branchiostegous rays six.

CHÆTODON PRÆTEXTATUS, Cantor.

Plate III.

Head as far as the occiput, gill-covers and throat black; on the chin a rounded white spot; a white band round the throat to the angle of the mouth; a second, also encircling the throat, obliquely upwards and forwards in front of the eye across the forehead; a third, narrow, backwards arched white line on the forehead between the eyes; a broad white band surrounding the chest, narrowing as it vertically ascends between the preopercle and the eye, and continues to a little in front of the first dorsal spine; body and the scaly part of the dorsal and anal fin light greyish brown; each scale minutely dotted with black, and on the body with a short central dark bar, reflecting a series of parallel lines ascending obliquely backwards; dorsal spines vermilion, their membrane light greyish brown; margin of the soft fin black (the very point of the rays colourless,) beneath bordered by a narrow white line, under which a broad vermilion band, gradually widening backwards; in some the latter is placed immediately under the black margin, and longitudinally divided by a narrow white line; on the anterior half of the caudal a vertical vermilion band, next a narrower black, behind which the rest of the fin is white; anal spines light brownish grey, membrane black; margin of the soft part black (the very point of the rays colourless,) bordered above by a broad crescent-shaped vermilion band; ventrals black; pectorals brownish or blackish at the root; the rays brownish white, membrane transparent. Iris milky white or buff.

D 12/26, 27 or 28, C $17\frac{4}{3}$, A $3/20$, 21 or 22, V $1/5$, P 15 or 16,

Br. VI.

HABIT.—*Sea of Pinang.*TOTAL LENGTH: $5\frac{6}{8}$ inch.

The outline of the much compressed body is broad oval, deeply emarginated behind by the three vertical fins; the profile descends nearly straight from the dorsal fin to the narrow, slightly elongated muzzle. The greatest vertical diameter of the body, taken from the root of the 7th dorsal spine, is $\frac{1}{2}$ of the total length. The length of the head, nearly equalling the height at the occiput, is about $\frac{1}{4}$ of the total length; the eye is situated a little above the centre of the longitudinal diameter, but in the centre of the greatest vertical diameter of the head; its diameter is $\frac{1}{3}$ of the length of the head. The mouth is slightly protractile, very small, the cleft being $\frac{1}{7}$ of the length of the head; the teeth are normal; the nostrils open near the anterior part of the orbit; the preopercle is narrow; near the angle are a few indistinct crenulations; the opercle terminates in a small flat membranous point. The black ocular band is in front bordered by the second white band, which obliquely encircles that part of the head; behind by the posterior white band, which from the chest proceeds vertically over the preopercle to a little in front of the anterior dorsal spine. As the profile of the head is sloping, the black ocular band is nearly three-sided, much broader above than below the eye. The dorsal spines gradually increase in length till the fifth which, as well as the rest, is nearly equal $\frac{2}{3}$ of the length of the head; the two anterior spines are exposed; the rest become gradually covered with scales which spread in an oblique arched line, so as barely to leave the points of the three last spines visible; the soft portion is gently arched, scaly, highest in the middle, where the rays slightly exceed the length of the fifth spine. The length of the caudal fin is a little more than $\frac{1}{2}$ of the length of the head; the posterior margin is straight when at rest, but rounded when expanded, and then more than double the length of the fin; the anterior $\frac{3}{4}$ are covered with scales. The anal commences opposite the 8th or 9th dorsal ray; the anterior spine is $\frac{2}{3}$ of the second and third, which in length equal the fifth dorsal; they are gradually covered with scales, so that of the last one third only is exposed; the soft part is rounded, scaly, its highest elevation in the middle equalling that of the dorsal. The ventrals commence opposite the termination of the root of the pectorals; the length of the spine is $\frac{1}{2}$ of that of the head, and $\frac{2}{3}$ of that of the first ray; above the root of each ventral appears a broad pointed scale. The length of the pectorals is a little more than

$\frac{1}{5}$ of the total. The scales of the body are rounded, higher than long, ciliated; those of the lateral line much smaller than the rest and nearly triangular; the line itself ascends backwards till opposite the 11th dorsal spine, from whence it descends, closely following the back to the termination of the soft dorsal fin. The lateral line follows a similar course in *Chætodon reticulatus*, Cuv. and Val. Of the present species two were observed at Pinang in May 1845, and in June eleven were taken together in a fishing net, all nearly of equal size. The fishermen asserted the fish to be an excellent article of food, but of rare occurrence, and not to attain greater dimensions. Like other species of this and the neighbouring genera, the present expires immediately, when removed from its element. It appears to be allied to *C. reticulatus* and *C. lunula*, Cuv. and Val.

GEN. CHELMON, *Cuvier* 1817.

Muzzle excessively long, slender, formed by the horizontally elongated intermaxillary bone and the lower jaw, both of which have one half or two thirds united by a membrane, so as to reduce the mouth to a small horizontal cleft at the extremity of the cylinder; teeth in both jaws fine, velvety; in other respects like *Chætodon*.

CHELMON ROSTRATUS, (Linné.)

Seba. III. Pl. 25, Fig. 17.

Chætodon rostratus, Lin. Mus. Ad. Fr. I. 61, Tab. 33, Fig. 2.

Chætodon rostratus, Linné, Syst. 1244.

Jaculator, Schlosser: Phil. Transact, 1764, 39, Pl. 9.

Chætodon rostratus, Bloch. Pl. 102, Fig. 1.

Chætodon enceladus, Shaw: Nat. Misc. 2, Pl. 67.

Chætodon rostratus, Shaw IV. 337, Pl. 47.

Chelmon rostratus, Cuv. R. A. II. 190.

Chelmon rostratus, Bennett: Life of Raffles, 689.

Chelmon rostratus, Cuv. and Val. VII. 87.

Ground colour of body and fins silvery, with one frontal and five vertical, lateral bands; all, except the fifth, orange or brownish ochreous, edged with blackish brown, outside of which with white; the frontal band along the profile of the head to the point of the elongated muzzle; the first lateral from the occiput through the iris to the throat; the second from between the first and second dorsal spine over the opercle

in front of the pectoral to the abdomen in front of the ventrals; the third from the sixth and seventh dorsal spine down to the anus; the fourth, the broadest, from between the ninth spine and the tenth dorsal ray to between the third anal; within this band, at the base of the soft dorsal, a rounded black spot edged with white; the fifth, in front of the caudal, black with white margins. The soft dorsal and anal with a black margin, the base of which bordered by a white line enclosed between two black ones; the anterior half of the caudal pale ochreous, the rest as well as the pectorals and ventrals white, the latter minutely dotted with black. Iris pale golden orange, longitudinally divided by the ocular band.

D 9/29, C $17\frac{3}{3}$, A $3/20$, V $1/5$, P 15, Br. V.

HABIT.—*Sea of Singapore, Malacca.*

Sea and rivers of Java, Sumatra.

TOTAL LENGTH: $5\frac{4}{8}$ inch.

Numbers were observed in May 1840, at Singapore; they were, however, all dead, and their colours apparently somewhat faded. The fish is considered excellent by the natives, and eaten both fresh and dried. At Malacca it appears to be of rare occurrence, and at Pinang no specimen was observed during upwards of four years search. The fishermen judging from a drawing, asserted that they were acquainted with the species, but they invariably brought *Platax ocellatus*, Cuv. and Val. instead, which in colours and their peculiar distribution, certainly offers a remarkable resemblance to the present species.

GEN. DIPHREUTES,* *Cantor.*

(*Equivalent to HENIOCHUS, Cuvier.*)

The anterior dorsal spines rapidly increasing in length, the third or fourth filamentous, sometimes double the length of the body, resembling a coach-whip; scales large.

DIPHREUTES MACROLEPIDOTUS, (Linné.)

Chætodon macrolepidotus, Linné, Syst. 1247.

Chætodon macrolepidotus, Bloch, Pl. 200, Fig. 1.

Chætodon bifasciatus, Shaw IV. 342.

Heniochus macrolepidotus, Cuv. R. A. II. 191. (')

Heniochus macrolepidotus, Cuv. and Val. VII. 93, Pl. 176.

* Διφρευτής, a charioteer. Substituted for *Heniochus*, Cuvier 1817, pre-occupied by *Henioche*, Hübner 1816. (*Lepidoptera*.)

Heniochus macrolepidotus, Temm. and Schl. F. J. Pisc. 82, Tab.

XLIV. Fig. 1. (*Young.*)

Heniochus macrolepidotus, Richardson, Report 1845, 246.

Young. Ground colour of the head and body milk-white; on the upper part of the muzzle, as far as the anterior opening of the nostrils, a small black rectangular band; between the eyes across the forehead, a backwards pointing angular black band; a broader, comprising the three anterior and in some the root of the elongated fourth dorsal spine, proceeds obliquely downwards over the side and posterior part of the opercle, from whence it becomes broader, spreading in front over the ventrals, behind over the spinous part of the anal, edging the soft part; a posterior black band, partially covering the 5th, 6th, 7th and 8th dorsal spine, proceeds obliquely backwards over the side covering the posterior half of the soft anal. The fourth elongated, flexible, dorsal spine and its membrane milk-white, minutely dotted with black; rest of the dorsal, the caudal and pectoral fins bright gamboge or citrine. Iris gamboge, blackish towards the orbit, divided by an oblique black band, appearing as a continuation of the angular one of the forehead.

D 11/25 or 26, C $17\frac{4}{3}$, A $3/18$ or 19, V $1/5$, P 17, Br. V.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula.*

Manilla, Moluccas, New Guinea, Celebes, Ceylon, Pondicherry, Isle of France, Mauritius, Mozambique, Japan.

TOTAL LENGTH: 6 inch.

Solitary young individuals, not exceeding the length given, occur at all seasons at Pinang.

GEN. ILARCHES,* *Cantor.*

(*Equivalent to* EPhippus, *Cuvier.*)

Body oval or nearly orbicular; dorsal fins two, or one deeply emarginated between the spinous and soft portion; the former not covered with scales, capable of reclining in a groove, formed by the skin of the back; anal spines three; pectorals oval.

ILARCHES ORBIS, (Bloch).

Chætodon orbis, Bloch, Tab. 202, Fig. 2.

Chætodon orbis, Linné, Syst. 1244.

* *Ιλάρχης*, commander of a troop. Substituted for *Ephippus*, Cuvier 1829, pre-occupied by *Ephippium*, Latreille 1802 (*Diptera.*)

Chætodon orbe, Lacép. IV. 458, 491.

Chætodon orbis, Shaw, IV. 339.

Ephippus orbis, Cuv. R. A. II. 191 (³).

Ephippus orbis, Cuvier and Val. VII. 127.

Ephippus orbis, Swainson, II. 213.

Ephippus orbis, Richardson Rep. 1845, 245.

Head above and back light greyish green; sides and abdomen silvery with pale lilac lustre; fin-membranes transparent, minutely dotted with black, giving the marginal half a blackish appearance; dorsal and anal spines and their membranes, pale silvery, the rays yellowish white. Iris pale golden, minutely dotted with black.

D 8—1/19, C 17 $\frac{5}{8}$, A 3/16, V 1/5, P 19, Br. VI.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula.*

Malabar, Tranquebar, Pondicherry, Indian and China Seas.

Total length: 5 $\frac{4}{8}$ inch.

The greatest vertical diameter of the head exceeds by $\frac{1}{2}$ its length, which is a little less than $\frac{1}{4}$ of the total; the greatest vertical diameter of the body is 1 $\frac{3}{4}$ in the total length. The young individuals, like those of *Ilarches faber*, (Brouss.) are of a less orbicular outline than the adult, their greatest vertical diameter being $\frac{1}{2}$ of the total length. On each side of the centre of the upper jaw appears a small pore, and on each side of the symphysis of the lower two similar, the one placed a little in front of the other. There is besides a larger pore or sometimes two on each branch of the lower jaw. The posterior margin of the caudal fin is not straight, but convex in the centre, above and below which it is slightly concave. In the young the colour of the dorsal membrane, particularly the upper half of the soft, the anal and the ventral is of a deeper black than in the adult. Although individuals occur at Pinang at all seasons, they are not numerous. The fish though bony, and considered indifferent, is by the natives consumed both fresh and dried.

GEN. HARPOCHIRUS,* *Cantor.*

(*Equivalent to DREPANE, Cuv. and Val.*)

Pectoral fins elongated, falciform, nearly reaching the base of the caudal; outline of the body almost quadrangular.

* "Ἀρπη, scythe; χεῖρ, hand. Substituted for *Drepene*, Cuv. and Val. 1831, pre-occupied by *Drepana*, Schrank 1802 (*Lepidoptera.*)

HARPOCHIRUS PUNCTATUS, (Linné).

Chætodon punctatus, Linné: Syst. 1243.

Chétodon faucheur, Lacépède.

Chætodon punctatus, Shaw, IV. 365.

Russell LXXIX. Latte.

Ephippus punctatus, Cuv. R. A. II. 191 (*).

Drepane punctata, Cuv. and Val. VII. 132, Pl. 179.

Drepane punctata, Swainson II. 213.

Drepane punctata, Richardson, Report 1845, 245.

Drepane punctata, Bleeker: Verh. Bat. Gen. XXII. 5.

Head and body iridescent silvery; the crest from the occiput to the dorsal fin blackish; the upper half of the sides with more or less regular vertical series of small black spots; in some a small black spot in the axilla, in others a single oblique series of spots at the base of the soft dorsal; spines and rays pale silvery, the anterior margins of the first dorsal ray black; fin-membranes whitish transparent, the scaly portion silvery, the marginal minutely dotted with black, in some sufficiently strong to impart a blackish appearance to the marginal half. Iris silvery.

D 8—1/20 or 21, C 17 $\frac{3}{5}$, A 3/17, V 1/5, P 17 or 18, Br. VI.

HABIT.—*Sea and estuaries Pinang, Malayan Peninsula, Singapore, Coasts of New Holland, New Guinea, Southern coasts of China, Java, Celebes, Madura, Bay of Bengal, Gangetic estuaries, Malabar.*

TOTAL LENGTH: 1 foot 5 inch.

The body appears to become elongated with age: in the adult the diameter from the angle of the back to that at the commencement of the anal fin is about $\frac{5}{6}$ of the length of the body, the caudal not included. In the young it is something more than $\frac{4}{6}$ of that distance. In the very young individuals the occipital crest is denticulated, and they are at all seasons numerous at Pinang, but large individuals occur rarely. In the largest observed, the length of which is given above, the rounded protuberance of the skull between the eyes is very large and prominent, and the roots of the four central caudal rays are enlarged and joined together without any intermediate membrane. A similar enlargement of the occipital crest and some of the bones occurs in adult individuals of *Platax arthriticus*, Cuv. and Val. The present species

is bony and insipid. It is, however, eaten by the natives in its fresh and dried state.

HARPOCHIRUS LONGIMANUS, (Bloch-Schneider.)

Chaetodon longimanus, Bloch-Schneider, 231.

Russell LXXX. Terla A.

Russell LXXXI. Terla B.

Ephippus longimanus, Cuv. R. A. II. 191 (*).

Drepane longimana, Cuv. and Val. VII. 133.

Drepane longimana, Richardson Report 1845, 245.

Young.—Head and body iridescent silvery; the crest from the occiput to the dorsal fin blackish; the upper half of the sides with four or five vertical, more or less distinct, lead coloured bands. Fins like *H. punctatus*. Iris silvery.

Adult.—Body uniformly iridescent silvery; rest like the young. Number of fin rays like *H. punctatus*.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singapore.*

Java, Bay of Bengal, Gangetic estuaries, Malabar, China Seas.

TOTAL LENGTH: $8\frac{4}{8}$ inch.

Except the colours, no external character can be assigned to distinguish the two species, but anatomical differences have been pointed out by M. M. Cuvier and Valenciennes. Large individuals are rarely seen at Pinang, but there, as in the mouths of the Ganges, young ones are very numerous. During life or shortly after death, none of those examined presented the red colour described by Russell.

GEN. CACODOXUS,* Cantor.

(*Equivalent to SCATOPHAGUS, Cuvier and Valenciennes.*)

Four anal, eleven dorsal spines; scales excessively small.

CACODOXUS ARGUS, (Linné.)

Chaetodon argus, Linné, Syst. 1248.

Chaetodon argus, Bloch, Tab. 204, Fig. 1.

Chaetodon argus, Shaw, IV. 332.

Russell LXXVIII. Chitsilloo.

Chaetodon pairatalis, Buchan. Hamilton, 122, 372, Pl. 16, Fig. 41.

* *Κακοδοξος*, ill-reputed. Substituted for *Scatophagus*, Cuv. and Val. 1831, pre-occupied by *Scatophaga*, Meigen 1802. (*Diptera.*)

Ephippus argus, Cuv. R. A. II. 191.

Chætodon atromaculatus, Bennett : Ceylon No. 18.

Scatophagus argus, Cuv. and Val. VII. 136.

Scatophagus argus, Richardson Report 1845, 245.

Scatophagus argus, Bleeker : Verh. Bat. Gen. XXII. 5.

Head above and back silvery blackish or brownish green, or purple, lighter on the sides; abdomen whitish or yellowish; back and sides, and in some the opercles, with blackish or brownish spots, in form, number and size liable to individual variations; dorsal and anal spines and membranes silvery, minutely dotted with black, imparting to the latter a more or less intense colour; dorsal, caudal and anal rays of the ground colour of the body, their membranes more or less intense black, with or without some smaller spots like those of the body; ventrals greyish or whitish, minutely dotted with black; pectorals whitish. Iris brown or blackish with a narrow golden circle round the pupil.

D 10—1/18, C 17 $\frac{1}{4}$, A 4/14, V 1/5, P 18, Br. VI.

HABIT.—*Estuaries and sea of Pinang, Malayan Peninsula, Singapore.*

Malabar, Ceylon, Bay of Bengal, Gangetic estuaries, Java, Celebes, Madura, Moluccas, China Sea.

TOTAL LENGTH: 10 inch.

The young are generally of more brilliant colours; in one taken in the Joomrah, one of the mouths of the Ganges, the dorsal spines and ventral fins were of a deep red. At Pinang this species is not very numerous. It is eaten by the natives, though many reject it on account of its reputed disgusting habits. In several examined in the estuaries of the Ganges, and at Pinang, the stomach contained remains of small fishes and crustacea. According to Bennett, it is in Ceylon angled on hooks baited with a kind of sea-weed ("Pendah,") of which this fish appears to be particularly fond.

GEN. *HOLACANTHUS*, Lacépède 1802.

With a large backwards pointed spine at the angle of the preopercle, the margins of which are toothed.

HOLACANTHUS ANNULARIS, (Bloch.)

Chætodon annularis, Bloch. Tab. 215, Fig. 2.

Chætodon annularis, Linné: Syst. 1262.

Holacanthus anneau, Lacépède IV, 526, 533.

Chætodon annularis, Shaw, IV. 330, Pl. 47.

Russell, LXXXVIII. Sahni Tchapa.

Holacanthus annularis, Cuv. R. A. II. 192 (^a).

Holacanthus annularis, Cuv. and Val. VII. 178.

Ground colour of the body and fins light brown with golden lustre, darker on the head; external half of soft dorsal and anal blackish; scales of the body with a central blackish spot; at a little distance above the shoulder and opercle a ring of deep blue, internally and externally edged with black; on the body a number of similarly coloured oblique, slightly arched bands: the anterior, from the 7th dorsal spine, obliquely downwards, terminating a little below the ring; the second from the 10th dorsal spine; the third from the 4th dorsal ray joins the termination of the two preceding bands; the succeeding radiate from about the 5th dorsal, each describing a larger arch, the fourth terminating opposite the point of the opercle; the fifth in the axilla, the sixth, seventh and eighth, which latter passes along the base of the anal, terminate between the root of the pectoral and ventral; the ninth passes vertically in front of the caudal fin, spanning the soft anal; the tenth and eleventh follow the course the ninth. From the orbit a short horizontal blue black edged band, which on the opercle divides in three branches, of which the lower passes obliquely down to meet the fourth of the body; from the nostrils to the upper part of the preopercle another horizontal band. Dorsal and anal spines white, covered by the brownish membrane; caudal, ventral and pectoral rays, light yellowish brown, membrane dark brown; the large preopercular spine white, the shallow groove on the external surface filled with a brown membrane; to the slightly convex upper margin is attached a black, loose membrane. Iris brownish golden, the orbital half speckled with black.

D 13/22, C 17 $\frac{1}{2}$, A 3/21, V 1/5, P. 18, Br. VI.

HABIT.—*Sea of Pinang.*

Moluccas, Malacca, Pondicherry, Vizagapatam.

TOTAL LENGTH: 1 foot.

In November 1843 a single individual was observed at Pinang. From the descriptions and figures published, it appears that the number and distribution of the bands are liable to individual variations.

In the one examined, the length of the entire fourth dorsal ray did not exceed that of the first ventral, whereas it commonly projects beyond the caudal fin. The figure of Russell is defective in not representing the loose membrane attached to the superior concave margin of the large spine, nor the dentitions of the margins of the preopercle.

GEN. PLATAX, *Cuvier* 1817.

Teeth setaceous, external series trilobate; body very compressed and high; dorsal spines few, hid in the anterior margin of the fin; anterior rays of dorsal, anal and ventral fins elongated, in some falciform.

PLATAX VESPERTILIO, (Bloch).

ADULT.

Chaetodon vespertilio, Bloch. Pl. 199, Fig. 2.

Chaetodon vespertilio, Linné, Syst. 1257.

Chaetodon vespertilio, Shaw, IV. 344.

Platax vespertilio, Cuv. R. A. 1817 II. 334, (³).

Platax vespertilio, Rüppell: Atlas, 143 (Verzeichniss) Note 5.

Platax vespertilio, Cuv. R. A. 1829, 193, (¹).

Platax blochii, Cuv. and Val. VII. 22.

Platax vespertilio japonicus, Temm. and Schl. Faun. Jap. Pisces, 83,
Tab. XLIII.

Platax vespertilio, Richardson, Report 1845, 245.

Platax blochii, Bleeker: Verh. Batav. Gen. XXII. 5.

Head and body pale bluish silvery brown, lighter on the cheeks, opercles, throat, sides and abdomen; the scales minutely dotted and edged with blackish brown, and sometimes with a few scattered small dark spots on the sides; the ocular, pectoral and caudal band indistinct; basal half of dorsal and anal fins like the body; upper half blackish; the rays whitish; caudal pale greyish transparent; posterior margin blackish; ventrals blackish; pectoral rays brownish yellow, with a broad brownish band at the base. Iris brownish golden, vertically divided by the ocular band.

D 5/36, 37, 38 or 39, C. 17 $\frac{1}{4}$, A 3/25, 26, 27 or 28, V 1/5, P 17 or 18, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Isle of France, Red Sea, Ceylon, Bay of Bengal, China Sea, Japan, New Guinea, Amboina, Java, Madura.

TOTAL LENGTH: 7 inch.

The greatest height* of the body is a little less than $\frac{3}{4}$ of the total length or equal the distance from the symphysis of the lower jaw to the termination of the dorsal and anal fins.

YOUNG.—VAR. A.

Seba III. 25, Fig. 15?

Chætodon pinnatus, Linné: Mus. A. F. Pl. 33, Fig. 6?

Chætodon pinnatus, Linné, Syst. 1241?

Chætodon vespertilio, Bennett: Ceylon No. 5.

Platax ehrenbergii, Cuv. and Val. VII. 221.

Platax ehrenbergii, (*Syn. vespertilio*) Rüppell: N. W. Fische, 33.

Platax ehrenbergii, Richardson, Report 1845, 245.

Head, body, dorsal and ventral fins light rust-coloured, or reddish ochre, lighter on the sides and abdomen, minutely dotted with black; on the forehead above the centre of each orbit a brown dot; from the occiput through the iris to the ventral spine a more or less distinct, often interrupted, blackish brown band; traces of a second such from the anterior dorsal spine to the pectoral fin; in some a blackish spot at the base of the anterior dorsal fin and a corresponding smaller at the base of the anal; a blackish spot at the termination of the base of the dorsal and anal fins; caudal pale reddish yellow with a vertical reddish brown band at the base; pectorals pale yellow, in some with a brownish line along the base. Iris golden of the ground colour of the body, vertically divided by the ocular band.

Total length from $1\frac{1}{8}$ to $4\frac{2}{8}$ inch.

YOUNG.—VAR. B.

Vlaming No. 199, Cambing.

Valentyn No. 62.

Renard Pl. 24, Fig. 129.

Platax albipunctatus, Rüppell: Atlas, 69, Tab. 18, Fig. 4.

Platax guttulatus, Cuv. R. A. II. 193 (?).

Platax guttulatus, Cuv. and Val. VII. 227 Pl. 186.

Platax vespertilio, Rüppell: Neue Wirbelth. Fische, 33.

Head and body pale silvery chocolate coloured; cheeks, opercle, throat and abdomen bluish white; on the forehead above each orbit a brown dot; from the occiput through the iris to the ventrals, a

* In the present and in the two succeeding species, it is calculated from the first dorsal to the first anal spine.

continued or interrupted dark brown band, or light brown with dark edges; from the first dorsal spine to the pectoral more or less distinct traces of a second band; on different parts of the body some scattered pearl-coloured spots, with dark brown edges and of irregular shape; base of dorsal and anal of the ground-colour of the body; rest of their membranes bluish white dotted with black; their margins blackish; rays light greyish; base of the caudal of the ground-colour of the body with a vertical, forwards arched, dark brown band; rest of the fin pale yellow; ventrals blackish; the fifth ray and its membrane whitish, minutely dotted with brown; pectorals yellowish white. Iris pale chocolate coloured, with a narrow golden ring, vertically intersected by the ocular band.

TOTAL LENGTH: $1\frac{2}{8}$ to $3\frac{3}{8}$ inch.

In individuals of the given dimensions, the greatest height equals the length of the body to the centre of the dark band on the caudal fin, or it is about $\frac{3}{8}$ less than the total. The elongation of the anterior dorsal, anal and ventral rays is liable to individual variations, the maximum of the two former fins not exceeding $\frac{3}{4}$ of the greatest height of the body. The ventrals never exceed $\frac{2}{3}$ of the greatest height. On each side of the lower jaw appear three minute distant pores. In the early age the teeth of the two or three external series are trilobate, but they become blunter with age. At Pinang young individuals with pearl-coloured spots, appear to be of rarer occurrence than the others.

The intestinal canal is nearly twice the length of the fish; of the five cæcopyloric appendages the three larger are of nearly equal length; the other two are very minute; the air-vessel is lanceolate, very thin, pearl coloured. In individuals of all ages the stomach contained remains of fishes and crustacea. Dr. Rüppell adds *Platax gaymardi*, Cuv. and Val. (VII. 216) to the synonymes of the present species.

PLATAX TEIRA, (Forskål).

Chætodon pinnatus, Chinens. Lagerstr. No. 25?

Chætodon teira, Forskål, 60 No. 82, Tab. XXII.

Chætodon teira, Bloch, Tab. 199 Fig. 1.

Chætodon teira, Linné, Syst. 1265.

Chætodon teira, Shaw, IV. 345, Pl. 48.

Platax teira, Cuv. R. A. II. 193 (').

Platax teira, Rüppell : Atl. 68.

Platax teira, Cuv. and Val. 226.

Platax teira, Rüppell : Neue Wirbelth. Fische 33, 37.

Young. Ground colour of the body, dorsal, anal and ventral fins pale silvery whitish, the scales edged with blackish brown or deep purple; opercles, throat and abdomen bluish white, minutely dotted with black; from the occiput, through the iris over the ventral soft fin a blackish band; a second from the anterior margin of the dorsal fin, spreading over the dorsal spines, continuing vertically over the posterior part of the opercle to the abdomen; a third over the posterior part of the dorsal, the body and the anal fin and over the base of the caudal; the rest of the caudal and the pectorals whitish. Iris pale golden, vertically divided by the ocular band.

Older. The vertical bands very indistinct; dorsal, anal and ventral fins bluish black or brown; caudal greyish brown, the margin blackish. Iris blackish or brownish with a narrow golden ring round the pupil.

D 5/31 or 32, C $17\frac{1}{4}$, A 3/23, 24 or 25, V $1\frac{1}{5}$, P 17, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Red Sea, Malabar, Bay of Bengal.

TOTAL LENGTH: 8 inch.

The greatest height equals the length of the body, the caudal fin not included; the latter, as also the head, being $\frac{1}{4}$ of the total length. The elongation of the anterior rays of the dorsal, anal and ventral fins is comparatively greater in young than in older individuals; in all, however, it is liable to considerable individual variations. The dorsal and anal are either equal or differing: in the young their greatest elongation exceeds by $\frac{1}{2}$ the greatest height of the body. The ventrals often differ among themselves: in the young their greatest length does not exceed the greatest height of the body, in older ones it slightly exceeds one half of that distance. On each side of the lower jaw appear three small distant pores. At Pinang smaller individuals occur at all seasons; larger ones are less frequent.

PLATAX ARTHRITICUS, Cuv. and Val.

Ecan bonna, Bell : Philosoph. Transact. 1793.

Chaetodon arthriticus, Cuv. and Val. VII. 229.

Head, back, sides, dorsal, caudal and anal fins dull chocolate brown or lead coloured, in some largely marbled with dark brown; abdomen

pale whitish; ventrals brownish yellow; pectorals whitish. Iris of the ground colour of the body, with a narrow golden ring.

D (5)/31, C $17\frac{1}{7}$, A (3)/23, V $1\frac{1}{5}$, P 17, Br. VI.

HABIT.—*Sea of Pinang, Singapore.*

Java, Sumatra.

TOTAL LENGTH: 1 foot 7 inch.

The dorsal and anal spines are so completely hidden, that they are imperceptible to the touch, but on close inspection their points may be perceived through the integuments. The greatest height equals the distance from the muzzle to the termination of the dorsal and ventral fins. The diameter of the eye is $\frac{1}{4}$ of the length of the head, which is about $\frac{1}{4}$ of the total. The large arched occipital crest, and the nodulous enlargement of some of the bones render this species easily distinguishable. On each side of the symphysis of the upper jaw appears a minute pore, and five somewhat larger on each side of the lower jaw. At Pinang this species is not numerous, although from October till January eight or ten are sometimes captured at the time in the fishing stakes. The flavour is considered excellent. The large air-vessel is too thin, and yields too little isinglass to become of value.

PLATAX OCELLATUS, Cuv. and Val.

Platax ocellatus, Cuv. and Val. VII. 229.

Ground colour of body and fins pale ochreous silvery; with one frontal and five lateral ferruginous bands, edged with black: a narrow frontal band along the profile of the head to the point of the muzzle; the first lateral from the occiput, describing a forwards directed arch, through the iris, over the cheek to a little in front of the ventrals; the second, less arched, from in front of the dorsal, bordering on the opercle, enclosing the base of the pectoral to midway between the ventrals and anus; the third following obliquely the two or three posterior dorsal spines, proceeds a little backwards down the side, to the anterior margin of the anal; the fourth, the broadest, from between the spine and soft part of the dorsal, describing a slightly backwards directed arch down the side and over the anterior third of the anal; at the base of the dorsal within this band a large rounded or oval black spot; the fifth band follows the margin of the soft dorsal; in front

of the caudal, within the black edges of this band, a vertical oval black spot with a broad white margin; the rest of the band following the margin of the soft anal, successively joins the fourth and third preceding bands; the dorsal spines and the angle they form with the rays of a brilliant orange, which spreads over the origin of the fourth and fifth bands. Anterior half of caudal ferruginous, posterior whitish, bluish or blackish towards the margin; pectorals yellowish white; ventrals milky white, the marginal half of the soft part black. Iris pale golden, vertically divided by the anterior lateral band.

D 6 or 7/29 or 30, C $17\frac{4}{5}$, A $3/19$ or 20, V $1/5$, P 15, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

TOTAL LENGTH: $3\frac{6}{8}$ inch.

The length of the head is a little less than $\frac{1}{4}$ of the total, its greatest vertical diameter slightly exceeding the length. The eye is situated a little above the centre of the vertical diameter of the head, close to the profile; the diameter is a little less than $\frac{1}{3}$ of the length of the head, equal the distance across the forehead. The form of the body is broad oval, the back and abdomen forming uniform arches, interrupted by the somewhat horizontally protracted muzzle. The greatest height of the body, from the root of the fourth dorsal ray to the first anal spine, exceeds by $\frac{1}{5}$ half the total length. The mouth is very small, slightly protractile, the lower jaw longer than the upper; the teeth setaceous, all uniformly pointed, none trilobate. The anterior dorsal spines are very short, the rest gradually increase, the last equalling the length of the head. The two or three anterior rays, the longest, slightly exceed $\frac{1}{2}$ of the greatest height of the body; the extent of the base of the dorsal fin equals the length of the body, the head and caudal not included. The posterior margin of the caudal is slightly arched; the length of this and the pectoral fins is about $\frac{1}{5}$ of the total. The third anal spine equals the fifth dorsal; the two anterior rays, the longest, measure $\frac{1}{2}$ of the longest dorsal rays; the extent of the base of the anal is less than $\frac{2}{3}$ of that of the dorsal. The ventral spine equals the fifth dorsal spine; the first ray is elongated, about the length of the head. The scales are rather large, orbicular, finely ciliated; the lateral line continues straight to a short distance from the head, where it rises to a moderate arch, gradually approaching the back till suddenly terminating beneath the last dorsal rays. The pro-

portions and the colours are the same in all ages. The uniformly setaceous teeth, the comparatively less height of the body and elongation of the dorsal and anal fins are characters which remove this species from the rest, and approach it to the Genus *Chætodon*. As above observed, the peculiar distribution of colours bears a striking resemblance to that of *Chelmon rostratus*, (Linné). During the month of May 1840 numerous individuals were daily observed in the fishmarket at Singapore. At Pinang single individuals occur during all seasons. The fish is eaten both fresh and dried by the natives, although reputed indifferent and bony.

GEN. MONODACTYLUS, Lacépède. 1800.

Body compressed; dorsal and anal scaly, more or less falciform, with their spines hid to the point in the anterior margin; teeth close, velvety; ventral spines minute, the latter so as easily to escape observation.

MONODACTYLUS RHOMBEUS, (Forskål.)

Scomber rhombeus, Forskål. Fauna Arab. 58, No. 78.

Centrogaster rhombeus, Linné: Syst. 1338.

Centropodus rhomboidalis, Lacépède III. 303, 304, 305.

Russell, LIX. Kauki Sandawa.

Psettus rhombeus, Cuv. R. A. II. 193 (*).

Psettus rhombeus, Cuv. and Val. VII. 245.

Monodactylus rhombeus, Swainson II. 212.

Adult. Profile of the head and back black; the rest above the lateral line golden green; sides of the head, opercles, and the body beneath the lateral line pale silvery; from the anus to the anal fin a black line; from the occiput to the centre of the upper margin of the orbit an oblique black band, continued through the pale golden iris, and in some over the cheek; a second similar band from the first dorsal spine to the point of the opercle; anterior margin of dorsal and the angle formed by the anterior six or eight rays black; the branched part of the succeeding rays gamboge, minutely dotted with black; the rest of the fin golden green; caudal gamboge, margin black or blackish; anterior margin of anal and the angle formed by the anterior four rays bluish black; the branched part of the succeeding rays pale bluish or blackish, minutely dotted with black; the rest of the fin greenish

or bluish silvery ; anal spines and rays white, the latter minutely dotted with black ; pectorals yellowish white.

Young. Like the adult, but the head, body, dorsal and anal fins, minutely dotted with black, in some so closely, as to impart a general blackish colour.

D $8\frac{2}{28}$, 29 or 30, C $17\frac{5}{3}$, A $3/29$ or 30, V $1/3$, 4 or 5, P 17 or 18,

Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Isle of France, Red Sea, Coromandel.

TOTAL LENGTH : $5\frac{1}{8}$ inch.

The length of the head is contained $3\frac{1}{2}$ times in the total ; its greatest vertical diameter is $\frac{1}{3}$ of the total length. The diameter of the eye is contained $2\frac{1}{2}$ times in the length of the head, but equals the distance across the forehead. The height of the body, between the origin of the dorsal and anal fins, is contained about $1\frac{1}{2}$ time in the total length : it equals the distance from the centre of the anterior part of the orbit to the termination of the dorsal and anal fins. Vertically measured, the dorsal equals the length of the head ; the anal is somewhat more ; it nearly equals the greatest vertical diameter of the head or about $\frac{1}{3}$ of the total length. The ventral spines are very short, but strong, each being $\frac{1}{10}$ of the length of the head ; at the base both are almost in contact, but their points diverge. The ventral rays of each fin are contained in a small groove in the body ; they are very minute and their number not only varies from 5 to 3 in different individuals, but also on either side in the same individual. The proposed genus *Psettus*, Cuv. and Val. 1831, is characterised as having no palatal teeth, which, as far as the present species is concerned, is a mistake. Forskål's diagnosis of *Scomber rhombeus* says : "*dentes numerosi subtiles. Lingua obtusa, prope apicem superne callo ovali, plano, albido, scabro,*" which is perfectly correct. All the teeth are velvety, "en velours ras et serré ;" those of both jaws appear like narrow bands ; of the vomer like a small rhombic elevation ; of the palate on each side like a lancet-shaped line, broader in front ; of each of the pterygoid bones like a triangular band, broader than the rest, and with the apex in front. On the oval tongue the teeth occupy the middle, leaving the margin naked. Single individuals occur during all seasons at Pinang, where they are eaten by the natives.

GEN. PIMELEPTERUS, *Lacépède* 1802.

Body oval, compressed; dorsal single, its rays, as well as those of the caudal and anal, covered with scales; the single external series of maxillary teeth trenchant, fixed by means of a horizontal posterior process resembling a talon.

PIMELEPTERUS OBLONGIOR, *Cuv. and Val.*

Pimelepterus oblongior, *Cuv. and Val.* VII. 264.

Adult? Head above and back blackish brown; the scales silvery brownish grey, edged with brown: those above the lateral line with darker brown than those below; each series of scales longitudinally separated from the succeeding by a lighter or darker ferruginous stripe, imparting to the body a striped appearance; from beneath the eye, over the cheek and opercle a ferruginous stripe; a second continued or interrupted, from behind the orbit to the point of the opercle; on the occiput some irregular ferruginous spots. Dorsal and anal spines and membrane pale greyish brown, or neutral tint, minutely dotted with brown; soft portion of dorsal, anal and the caudal of the ground colour; their marginal part blackish; ventrals pale bluish grey, minutely dotted with brown, marginal half blackish; pectoral rays buff, membrane transparent; the scales of the base and those between the rays like those of the body. Iris silvery near the pupil, the rest bluish black or brown.

Young. Ground colour of the body paler and with a bluish tint; lateral stripes paler and fewer.

D 11/12, 14 or 15, C $17\frac{2}{3}$, A 3/12, 13 or 14, V $1\frac{1}{5}$, P 18 or 19, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula.*

TOTAL LENGTH: $7\frac{5}{8}$ inch.

The length of the head is contained less than four times in the total: its height at the occiput equals the length. The eye is situated above the centre of the head, nearer the muzzle than the gill-opening: its horizontal diameter is about $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body slightly exceeds $\frac{1}{3}$ of the total length. The number of external maxillary teeth appears to increase with age: the largest individual examined had 30 in each jaw. Their size decreases from the centre towards the angles of the mouth; the posterior, horizontal process is slightly longer than the anterior trenchant one. Behind the external series is a narrow crescent-shaped

naked space, from the posterior concave margin of which rises a single series of minute, distant, backwards arched teeth. On the vomer appears a transversely oval elevation with velvety teeth; on each palatal bone a narrow line, and on each pterygoid a broad lanceolate elevation with similar teeth. The tongue is small, but broad, rounded in front; on each side of the base appears a small oval spot of velvety teeth. The largest individual presented nine longitudinal series of scales above the lateral line, eighteen below, the longest of which contained 52 scales. The anal spines gradually increase in length: the posterior, the longest, is less than $\frac{1}{2}$ of the length of the succeeding ray. From the figure of *Pimlepterus boscii*, Lacépède (Cuv. and Val. Pl. 187,) it would appear, that in that species the second and third anal spines are of equal length. At Pinang single individuals of the present species occur, but rarely, during all seasons. The flavour is said to be very good.

GEN. PEMPHERIS, Cuvier 1829.

Anal fin long, scaly; dorsal short, elevated; head obtuse; eye large; opercle with a small spine; velvety teeth in the jaws, on the vomer and palatal bones.

PEMPHERIS MOLUCCA, Cuv.

Pempheris molucca, Cuv. R. A. II. 195 (').

Pempheris moluca, Cuv. and Val. VII. 306.

Pempheris molucca, Temm. Schl. Fauna Japon. Pisc. 85, Pl. XLIV.
Fig. 3.

Pempheris moluca, Richardson, Report 1845, 244.

Young. Head above and back pale metallic copper-coloured, lighter on the upper half of the sides; cheeks, opercles and abdomen silvery with golden and steel-blue reflections; all parts minutely dotted with brown, on the opercles and cheeks so closely as to acquire the appearance of a brown band following the posterior and the inferior margin of the orbit; lateral line pale orange; fins pale reddish yellow; the scaly portion of the dorsal, caudal and anal coloured and dotted like the body; the upper half of the dorsal spines and membrane so closely dotted with reddish brown, as to acquire a general brownish appearance. Iris pale golden round the pupil; the rest minutely and closely dotted with black.

D 6/9, C $17\frac{5}{8}$, A $3\frac{1}{2}$, V $1\frac{1}{5}$, P 19, Br. VII.

HABIT.—*Sea of Pinang.*

Moluccas, Batavia, Japan.

TOTAL LENGTH : $3\frac{4}{8}$ inch.

The length of the head is contained $4\frac{1}{3}$ times in the total : its greatest vertical diameter equals the length. The profile between the eyes is not convex, but somewhat concave, owing to a slight projection of the upper margin of the orbit, thus intersecting the profile. The diameter of the eye is a little less than $\frac{1}{2}$ of the length of the head ; the orbit occupies the upper half, nearer the muzzle than the gill-opening. The greatest vertical diameter of the body, at the origin of the dorsal fin, is about $\frac{1}{3}$ of the total length. The stomach is thick, leathery, with four larger and two smaller appendicula cœcopylorica. The intestinal canal is $\frac{3}{4}$ of the length of the fish. The gall bladder is long, linear. The air-vessel large, thick ; the anterior third is rounded, joined by a constriction to the posterior oval portion. A single young individual was observed at Pinang in May 1845.

GEN. TOXOTES, *Cuvier* 1817.

Body short and compressed ; dorsal fin placed on the posterior half of the back, with very strong spines ; soft part of dorsal and anal scaly ; muzzle depressed, short ; lower jaw projecting beyond the upper ; velvety teeth in the jaws, vomer, palatals, pterygoids and on the tongue ; lower margin of infraorbital and preopercle finely toothed ; branchiostegous rays 7.

TOXOTES JACULATOR, (Pallas).

Sciæna jaculatrix, Pallas : Spicil. Fasc. 8, 41.

Sciæna jaculatrix, Hommel : Phil. Transact. LVI. 1766. p. 187.

Scarus schlosseri, Linné : Syst. 1282.

Sciæna jaculatrix, Bonnaterre : Encycl. Method. Pl. d'Ichthyol. 121.

Scarus schlosseri, Lacépède IV. 5, 17.

Labre sagittaire, Lacépède III. 425, 463.

Scarus schlosseri, Shaw, IV. 398.

Labrus jaculator, ibid. 485, Pl. 68.

Toxotes jaculator, Cuv. R. A. II. 196.

Coius chatareus, Buchan. Hamilton, 101, 370, Pl. 14, Fig. 34.

Toxotes jaculator, Cuv. and Val. VII. 314, Pl. 129.

Toxotes jaculator, Swainson, II. 214.

VAR. MALACCENSIS, Cuv. and Val.

Cuv. and Val. VII. 320.

Ikan sumpit or Sa sumpit of the Malays.

Head above silvery olive green, brown or blackish, all the rest silvery buff or greyish; all the scales with minute brown dots, either spread or collected round the centre, so as to produce faint brownish longitudinal lines; along the side five large rounded spots: the first on the occiput in front of the opercle; the second behind the opercle, intersected by the lateral line; the third between the spiny and soft dorsal; the fourth close to the termination of the soft dorsal; the fifth at the upper half of the root of the caudal; above this series another of smaller black spots, viz. one between the first and second lower spots; another between the second and third; a third at the centre of the base of the soft dorsal; in some the upper series of spots is confluent along the back; some have a small black spot on the symphysis of the lower jaw. Dorsal spines and membrane either brownish black or greyish, minutely dotted with black; the soft dorsal silvery olive, with a large oblique black spot joining the third of the upper dorsal series; another spreading over the upper half of the posterior seventh or eighth ray; margin of the soft portion black; caudal bright gamboge with a more or less distinct black, backwards arched band behind the root; upper half of anal silvery olive or greyish green, lower half black; pectorals and ventrals white, the latter with a large black spot, in some occupying nearly the whole space between the first and fourth ray. Iris bright gamboge or orange, blackish towards the orbit.

D 5/12 or 13, C 17 $\frac{5}{8}$, A 3/15, 16 or 17, V 1/5 P 13 or 14, Br. VII.HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

New Guinea, Isle of Búru, Java, Malabar, mouths of the
Ganges.

TOTAL LENGTH: 7 inch.

This appears to be the variety, described by M. M. Cuvier and Valenciennes from a drawing in the series, formerly in the late Colonel Farquhar's possession. The food of several examined, consisted of remains of crustacea. In the Straits of Malacca this fish occurs, but not numerously, at all seasons. It is eaten by the Malays, who record its habits in the denomination: *ikan* signifying a fish, *sumpitan* a blow-pipe.

FAM. TÆNIOIDÆ.

GEN. CEPOLA, Linné 1766.

Body elongated, compressed like a sword-blade; dorsal and anal fins very long; caudal pointed; ventrals attached under the pectorals; muzzle obtuse; jaws opening nearly vertically, with pointed teeth; the ventrals are the only fins preceded by a bony spine.

CEPOLA ABBREVIATA, Cuv. and Val.

Cepola abbreviata, Cuv. and Val. X. 403.

Cepola variegata, Swainson II. Appendix, 402.

Head above carmine; cheeks and opercle paler; jaws, preopercle and throat silvery whitish; back deep flesh-coloured, paler, with silvery reflections on the sides and abdomen, pale bluish under the pectorals; lateral line silvery; along the middle of the sides a longitudinal series of about 14 round, distant, orange, or cornelian-red spots, gradually decreasing in size towards the caudal; dorsal and anal rose-coloured, deepening to crimson on the marginal half; anal edged throughout, dorsal at the posterior part, with dark purple; membranes sparingly dotted with brown; caudal rays black; membrane cornelian-red; pectorals transparent, ventrals white. Iris silvery rose-coloured, orbital margin black.

D 72 or 74, C 13, A 74, V $1\frac{1}{5}$, P 19, Br. VI.

HABIT.—*Sea of Pinang.*

Moluccas, Anjer (Java,) China.

TOTAL LENGTH: $7\frac{6}{8}$ inch.

The length of the head is $\frac{1}{8}$ of the total; the depth at the occiput $\frac{3}{4}$ of the length. The distance from the muzzle to the eye is $\frac{1}{5}$ of that from the muzzle to the point of the opercle. The diameter of the eye is $\frac{1}{3}$ of the length of the head. In each jaw appears a single series of small pointed recurvous teeth, of which those near the symphysis are a little longer than the rest. There are about 24 on each side of the upper, 12 on each side of the lower jaw. On the lower margin of the preopercle appear five rather strong spines: two pointing obliquely backwards and downwards at the angle, and three, pointing forwards, along the margin. The cheeks and opercles are covered with scales, the rest of the head is naked. The vertical diameter at the pectorals nearly equals the length of the head; the diameter in front of the

caudal is scarcely $\frac{1}{6}$ of the former. The body is covered with small rounded scales, considerably larger, however, than in *Cepola rubescens*, Linné. The lateral line, like a thin cord, consists of keeled scales. It proceeds from the upper part of the gill-opening obliquely upwards to the fourth dorsal ray, from whence it accompanies the base of the dorsal fin to the termination, which latter is joined to the caudal. The length of the longest dorsal ray is $\frac{1}{2}$ of the vertical diameter of the body. The anal commences opposite the eighth dorsal ray; the longest rays slightly exceed those of the dorsal. The pectorals are rounded, their length is $\frac{1}{14}$ of the total. The ventrals are situated a little in front of the pectorals, and are a little shorter; the first ray terminates in a filament reaching the anus, or origin of the anal fin; the fifth ray has three fourths of its length attached to the abdomen by a membrane. The caudal is pointed; its length is $11\frac{1}{2}$ in the total. The stomach is small, but thickened. There are eight cæcopyloric appendages. The intestinal caudal is $\frac{1}{8}$ of the length of the fish. The air-vessel is rather large, silvery. Two individuals occurred at Pinang in March and April 1845. The smaller, 4 inches in length, resembled the one just described, in colours and in the distribution of the spots; but it differed in the following dimensions. The length of the head was $6\frac{1}{2}$ in the total, of which the caudal and the pectorals measured $\frac{1}{9}$. Both head and these fins, therefore, were proportionally considerably longer in the smaller than in the larger individual. The specimen in the Zoological Society's Museum, London, described by Mr. Swainson, measures one foot in length.

FAM. GOBIOIDÆ.

GEN. GOBIUS, Linné, 1748.

Head depressed with pores between the eyes; dorsal fins two, distinct, rays of both flexible; ventral fins united at the edges, forming a circle; vent with a tubercle; body covered with scales, the free edges of which ciliated; teeth small, numerous; branchiostegous rays 5.

GOBIUS ELEGANS, Kuhl. and Van. Hasselt, VAR.

Buff with a tinge of olive, minutely dotted with brown; the upper half of the sides with 3 or 4 indistinct lines, each formed by a series of very short brown streaks, beneath which a series of indistinct brown spots; a blackish spot at the posterior margin of the orbit; a second

at the upper part of the root of the pectoral fin, and a third at the lower part of the root, spreading on the gill-membrane. Near the lower part of the root of the pectoral is a faint trace of a fourth brown spot. The membranes of the fins are of a very pale bluish green, minutely dotted with brown; those of the dorsals, particularly the second, with 3 or 4 indistinct series of blackish spots, and a few similar on the caudal membrane. The rays of the anterior dorsal have 2 or 3 series of brown spots. Iris pale greenish silvery, minutely dotted with brown.

D 6—1/9, C $18\frac{3}{7}$, A 1/8, V 1/5, P 18, Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $3\frac{4}{8}$ inch.

A single individual observed differs from *Gobius elegans*,* found in Vanikolo, New Guinea, Java, and Bombay, in having one soft ray less in the 2nd dorsal and anal-fins; and slightly in colours, which differences however appear not sufficient to constitute a distinct species.

GOBIUS KOKIUS, Cuv. and Val.

Russell LI. Koku.

*Gobius koki*us, Cuv. and Val. XII. 68.

*Gobius koki*us, Jacquemont, Atlas: Pl. 14, Fig. 3?

*Gobius koki*us, Jerdon, Madras Journ. XV. 148.

*Gobius koki*us, Bleeker: Verh. Batav. Gen. XXII. 24, 5.

Head above and back greenish brown, sides pale reddish yellow; abdomen white; the back with 5 large, distant, brownish spots; 5 similar on the sides, the latter disposed beneath the intervals of the former. The rays and membranes of the dorsal and caudal fins with brown spots distributed in transversal series, which, however, are frequently very indistinct, and in some scarcely perceptible. One or two brown spots appear in some at the root of the pectoral fins, the membrane of which and of the ventral and anal fins is whitish. The lower half of the anal and caudal membrane is blackish in some individuals. Iris golden, in some dotted with black.

D 6—1/9, C $16\frac{3}{3}$ or $19\frac{7}{7}$, A 1/8, V 1/5, P 20 or 21, Br. V.

HABIT.—*Fresh-water and sea of Pinang.*

Isle of France, Malabar, Coromandel, Orissa, Java, Madurà.

TOTAL LENGTH: $8\frac{4}{8}$ inch.

* Cuv. and Val. XII. 58.

This species is closely allied to *Gobius giuris*, Buch. Ham. from which M. Valenciennes observes, it chiefly differs in the comparatively smaller eye, the diameter of which is $\frac{1}{6}$ or $\frac{1}{7}$ of the length of the head, while in *G. giuris* it occupies the second fourth of the length of the head.

GOBIOUS SUBLITUS, Cantor.

Pale greyish brown, lighter on the sides, abdomen buff; back and sides with six indistinct parallel longitudinal streaks, produced by a short brownish line dividing each scale; fin-membranes minutely dotted with brown; anterior dorsal with a central transversal whitish waved band, and a similar at the base; second dorsal and caudal with 4 or 5 transversal series of oval whitish spots; anal with a subterminal reddish white band; the posterior pointed part of this fin, as well as the outer half of the ventrals and pectorals, blackish. Iris pale golden.

D 6—1/9, C 15 $\frac{2}{3}$, A 1/8, V 1/5, P 19, Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 3 inch.

The head is elongated, $\frac{1}{4}$ of the total length, depressed; the breadth of the nape a little less than the depth, which equals $\frac{1}{3}$ of the length of the head; the profile gently sloping; the cheeks and opercles tumid; the eyes are nearly vertical, occupying the second fourth of the head, and placed excessively close together; the muzzle pointed; the lower jaw slightly longer than the upper; the mouth very large, oblique, the angle situated beneath the posterior margin of the orbit. The teeth of both jaws are crowded, card-like, of unequal length, the external series shorter than the rest, distant, bent inwards. On each side of the symphysis of the upper jaw, on the internal series, is a pair of teeth in length exceeding all the rest. The anterior teeth of the inner series of the lower jaw are somewhat longer than the rest; the tongue is smooth flattened, crescent-shaped. The body is elongated, its greatest depth being about $6\frac{1}{2}$ times in the total length. The scales are rather large, finely ciliated, with striæ converging towards the centre of the posterior margin. The longitudinal series, from the root of the pectoral to the caudal, contains about 38 scales. The height of the first dorsal is $\frac{1}{8}$ of the total length; the fifth ray

is slightly longer than the rest, and terminates in a short filament; the membrane is carried very close to the origin of the second dorsal, the height of which is $\frac{1}{7}$ of the total length. In extent and height the anal is a little less than the former: the posterior extremity of both is pointed. The caudal, ventral and pectoral fins are a little pointed, of nearly equal length, $\frac{1}{3}$ of the total. The species is not numerous: it appears to be closely allied to *Gobius biocellatus*, Cuv. and Val. (XII. 73), but it differs in its dentition and the filamentous fifth ray of the anterior dorsal.

GObIUS APOGONIUS, Cantor.

Back brownish, sides and abdomen buff, opercles minutely dotted with black. Back and sides with 5 or 6 parallel, sometimes interrupted, series of black spots; fin-membranes buff; on the anterior dorsal two elongated black spots, of which the posterior between the 4th and 5th ray; the second dorsal and anal fin with 2 or 3 transversal series of black spots, and with their free margins black; caudal edged with black with a number of somewhat irregular transversal series of black spots; ventrals with the extremities of the two central rays (the fifth) black. Iris pale golden, spotted with black.

D 6— $1\frac{1}{8}$, C $15\frac{1}{2}$, A $1\frac{1}{3}$, V $1\frac{1}{5}$, P 18, Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $2\frac{4}{8}$ inch.

The general outline, the short robust make, and the large scales impart to this species a certain resemblance to the Genus *Apogon*. The head is about $\frac{1}{4}$ of the total length, depressed, sloping; the muzzle broad, rounded; the eyes are lateral, near the upper profile, occupying the second fourth of the head; their distance across the head, and that from the lower margin of the orbit to the angle of the mouth, equals the diameter of the eye, or one fourth of the length of the head. The jaws are nearly semi-circular, the lower slightly projects beyond the upper; the mouth is obliquely cleft, the angle situated under the middle of the orbit. The teeth of both jaws are velvety, the external series of the upper consists of a few distant teeth, slightly larger than the rest; in the lower jaw there is a similar internal series, of which the two nearest the symphysis have the appearance of

small canines. The tongue is thin, narrow, crescent-shaped, and smooth. The profile of the forehead rises obliquely towards the first ray of the anterior dorsal, where the vertical diameter equals about $\frac{1}{3}$ of the total length; from thence the arched profile of the back and abdomen gradually converge towards the last ray of the second dorsal and anal fins, the vertical diameter between which equals $\frac{1}{6}$ of the total length, and such it continues to the root of the caudal. The height of the first ray of the anterior dorsal fin equals one half of the greatest vertical diameter; the second and third rays gradually increase; the fourth terminating in a filament, slightly exceeds the greatest vertical diameter of the body; but the sixth ray scarcely equals half the height of the first. The second dorsal and the anal fin are nearly opposite, on a backwards sloping level, their extent being somewhat less than $\frac{1}{8}$ of the total length. Their sixth, divided, rays, are the longest and equal about one-sixth of the total length. Their first and last rays are about $\frac{1}{9}$ of the total length. The distance between the anterior and second dorsal is about $\frac{1}{3}$ of that between the latter and the caudal fin. The latter is rounded, about $\frac{1}{4}$ of the total length. The pectoral fins are rounded, nearly as long as the caudal, and with the rays slightly filamentous. The ventrals are a little pointed, and scarcely exceed one half the length of the pectorals. The scales are generally very large, particularly on the crown of the head, and the opercles finely ciliated, and striated; their breadth double their length. The longitudinal series, from the root of the pectorals to the caudal, contains about 25 scales; the sides behind the second dorsal and the anal fins are covered by 5 vertical series.

A few individuals were occasionally observed among the fishes taken in the stakes off the coast of Pinang. This species is closely allied to another from the estuaries near Calcutta: *Gobius sadanundio*, Buchan. Ham. (*Gangetic Fishes*, 52,366) among whose duplicate series of drawings there is a representation. In the number of rays and the large size of the scales both agree, and the black markings of the fins and the body are also nearly the same. But *G. sadanundio* is of a strikingly more elongated shape, the third ray of the anterior dorsal fin is the longest, and the fourth is shorter not terminating in a filament. *Gobius filusus*, Cuv. and Val. (XII. 78) appears also to be allied to the present species.

GOBIUS ACUTIPENNIS,* Cuv. and Val., VAR.

Brownish buff with some indistinct blackish clouded spots on the back and sides; fin-membranes bluish white, minutely dotted with black; the two dorsals and the upper third of the caudal with indistinct transversal series of blackish spots. Iris blackish silvery.

D 6—1/12, C 17 $\frac{4}{5}$, A 1/13, V 1/5, P 22, Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 3 $\frac{4}{8}$ inch.

The rays of the first dorsal gradually increase towards the fifth, which terminates in a filament, in length slightly exceeding $\frac{1}{3}$ of the total. The second dorsal and the other fins are pointed; the length of the caudal is $\frac{1}{3}$ of the total; that of the head slightly exceeds $\frac{1}{3}$. In both jaws the teeth are placed in a single series; those of the upper are a little longer and more distant than those of the lower; there are no canines. *G. acutipennis*, Cuv. and Val. has 10 branched rays in the second dorsal and 11 in the anal. But in proportions and colours it closely agrees with the present.

GOBIUS CRINIGER, Cuv. and Val.

Gobius criniger, Cuv. and Val. XII. 82.

Pale ochreous with faint silvery lustre; abdomen whitish; head and upper jaw black; three round black spots on the cheeks; a fourth larger at the posterior angle of the orbit; a similar on the opercle; on the sides three large rounded black spots: the anterior behind the pectoral fin, spreading on the back; the second below the posterior part of the second dorsal, and the third at the root of the tail. Between these spots several smaller, irregular black marks. The fin-membranes whitish, that of the ventrals minutely dotted with black. That of the two dorsals and the caudal with rather large black spots; the free margin of the caudal and anal black. Iris pale golden, blackish.

D 6—1/9, C 13 $\frac{3}{7}$, A 1/9, V 1/5, P 17, Br. V.

HABIT.—*Sea of Pinang.*

New Guinea, Malabar.

TOTAL LENGTH: 2 $\frac{6}{8}$ inch.

The occiput and the opercles are without scales; the rest of the body with large ciliated, faintly striated scales, of which the longitudinal

series from the root of the pectoral to the anterior part of the caudal contains about 34. The length of the head is about $\frac{1}{4}$ of the total. The second ray of the anterior dorsal is the longest, terminating in a filament; its length is double that of the greatest vertical diameter, or a little less than $\frac{1}{4}$ of the total length. The teeth are minute, velvety, of nearly equal length. This species appears not to be numerous at Pinang.

GوبيUS CYANOCLAVIS, Cantor.

Greenish-grey, paler on the abdomen; the scales with a central azure spot, forming on the body from 5 to 8 longitudinal series; the opercle and root of the pectorals with a few similar spots; anterior dorsal minutely dotted and clouded with brown; second dorsal black, pale at the base, upper margin orange, between the rays 3 to 5 white oval spots, forming transversal series; caudal similarly coloured, but with the upper half of the posterior margin orange; anal intenses, ventrals and pectorals paler black, the anterior margin of each of the anal branched rays accompanied by a blue streak. Genital papilla with an orange coloured apex. Iris golden, spotted with black; pupil strongly iridescent.

D 6— $1/10$, C $17\frac{4}{5}$, A $1/10$, V $1/5$, P 19, Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 6 inch.

The head is a little depressed, the profile slightly sloping, the length $\frac{1}{5}$ of the total; the breadth at the nape is contained $2\frac{1}{2}$ times in the depth, which exceeds one half of the length of the head; the cheeks are tumid; eyes obliquely oval, nearly vertical, situated nearer the posterior angle of the preopercle than the muzzle; their greatest diameter is about $\frac{1}{3}$ of the length of the head; their distance $\frac{2}{3}$ of the greatest diameter; the muzzle is bluntly rounded, the lower jaw slightly projecting beyond the upper; the gape is wide, the angle of the mouth is beneath the posterior margin of the orbit. The teeth of the upper jaw are generally minute, but the anterior 4 or 5 on each side a little longer than the rest; the external series on each side of the lower jaw consists of 9 teeth, of which the two last towards the angle of the mouth are stronger, and much longer than the rest, and recurvous. These teeth M. Valenciennes compares with the fangs of venomous serpents. The other teeth are minute like those of the upper jaw. On the lower part of

the margin of the preopercle appear five pores of which the two upper ones are a little larger than the rest. The scales of the nape, of the opercle and of the root of the pectorals are much smaller than those of the body which are very large, finely ciliated and striated. The longitudinal series from the root of the pectoral to the caudal contains about 32 scales. All the rays of the anterior dorsal terminate in filaments: the third is the longest, equalling nearly half the total length; next to that is the fourth ray; the sixth is the shortest, but all except the third, are liable to individual variations. The posterior dorsal and anal fins are pointed, increasing in height towards the last, double, ray, which is about $\frac{1}{3}$ of the total length. The caudal is contained $4\frac{1}{2}$ times, the pectorals and ventrals 6 times in the total length: all these fins are broad, and a little pointed. The species is of no uncommon occurrence: it is closely allied to *Gobius caninus*, Cuv. and Val. (XII. 16).

GObIUS RUSSUS, Cantor.

Flesh or pale salmon-coloured; back blackish; on each side 4 or 5 large clouded blackish spots, the scales of which have a minute vertical lanceolate whitish spot in the centre; first dorsal whitish at the base and at the upper margin, with two transversely waved blackish bands, separated by a white, which surrounds a large black spot between the 4th and 5th rays; posterior dorsal whitish, minutely dotted with brown, and with two irregular transversal series of pale blackish, clouded, spots; rays of dorsals and anal flesh-coloured; membranes of caudal, anal, ventral and pectoral fins whitish, minutely dotted with brown. Iris pale golden, spotted with black.

D 6— $1/10$, C $19\frac{1}{4}$, A $1/10$, V $1/5$, P 18, Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $4\frac{3}{8}$ inch.

The head is depressed, the profile slightly sloping from the eyes; the length equals that of the caudal, and is contained about $4\frac{1}{2}$ times in the total length; the breadth at the nape is a little less than the height which is about $\frac{1}{2}$ of the total; the cheeks tumid; the eyes oval, lateral, situated on the profile, occupying a little more than the second fourth of the head, nearer the muzzle than the angle of the preopercle; the muzzle is broad rounded; the lower jaw a little longer than the upper; the gape is wide, oblique, the angle is situated beneath the middle of the

orbit. The teeth are velvety; the 4 anterior on each side of the upper jaw are distant and longer than the rest. The external series of the lower jaw consists of five similar teeth on each side, the last of which is slightly recurvous, but in length scarcely exceeding the four anterior. The space between the nape and the anterior dorsal is naked; the rest of the body is covered with small ciliated, striated scales, which are indistinct and almost hidden in the skin. The rays of the anterior dorsal terminate in short filaments; the first is the longest, scarcely exceeding the vertical diameter at the nape, or about $\frac{1}{8}$ of the total length; the membrane closely approaches the posterior dorsal, which, as well as the anal, slightly increases in height towards the 9th branched ray, the length of which equals the first ray of the anterior dorsal. The caudal, ventral and pectoral fins are broad, slightly pointed; the length of the two latter is little more than $\frac{1}{2}$ of the total. The species is not numerous: it closely approaches *Gobius phalaena*, Cuv. and Val. (XII. 92).

GEN. APOCRYPTES, Cuv. and Val. 1837.

(SCARTELAOS,* Swainson, 1839.)

Ventral fins united as in *Gobius*; two dorsals; body elongated; caudal long, pointed (lanceolate); teeth pointed, distant, in a single series in both jaws, near the symphysis of the lower two teeth a little behind the rest; scales small.

APOCRYPTES LANCEOLATUS, (Bloch-Schneider).

Eleotris lanceolata, Bloch-Schneider, 67, Pl. 15.

Gobius changva, Buchan. Ham. 41,365, Pl. 5. Fig. 10.

Apocryptes changva, Cuv. and Val. XII. 145.

Scartelaos calliurus, Swainson, II. 280.

Apocryptes changva, Bleeker: Verh. Batav. Gen. XXII. 36, 5.

Head, cheeks and opercles blackish olive, bluish beneath; back blackish olive; sides greenish or bright gamboge mottled with blackish; abdomen whitish or rose-coloured; dorsal fins minutely dotted with black. The rays of the second in some with brownish spots; in the young both are transversely waved with pale brown; caudal with alternate vermiculated brownish and whitish lines, and at the upper part of the root a black ocellated spot; anal, ventrals and pectorals buff or pale yellowish. Iris buff.

* By mistake characterised as being destitute of scales.

D 5—1/30 or 31, C 17 $\frac{4}{4}$, A 1/29, V 1/5, P 18, Br. V.

HABIT.—*Estuaries of Pinang, Malayan Peninsula, Singapore.*

Batavia, Madura, Rangoon, Pondicherry, estuaries of the

TOTAL LENGTH : 6 $\frac{4}{8}$ inch.

Ganges.

The species is numerous at Pinang.

APOCRYPTES NEXIPINNIS, Cantor.

Slate-coloured, lighter on the abdomen ; throat bluish white ; fin-membrane of the united dorsals and of the caudal minutely dotted with brown, giving the fins a greyish appearance ; anal and ventrals transparent, pectorals blackish grey, divided in the middle by a crescent-shaped transparent band, which expands over the lowest eight rays.

Iris slate-coloured.

D 6/26, C 17 $\frac{4}{4}$, A 1/25, V 1/5, P 21. Br. V.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH : 3 $\frac{3}{8}$ inch.

The head is depressed, gently sloping before the eyes ; the breadth at the nape exceeds the vertical diameter by one third, and equals $\frac{1}{3}$ of the length of the head ; the latter is $\frac{1}{4}$ of the total length ; the eyes are vertical, oval, occupying the third seventh of the length of the head ; their distance is somewhat less than their diameter. The muzzle is rounded, the lower jaw slightly projects beyond the upper ; the gape is enormous, almost horizontal ; the angle of the mouth marks the anterior half of the length of the head. The anterior tooth on each side of the symphysis of the upper jaw is excessively long, curved and projecting beyond the lower jaw when the mouth is closed. At a distance from these canines commences on each side a single series of 12 to 14 smaller, distant teeth, placed almost horizontally, and arched downwards. The thin membranous upper lip covers all the teeth except the two foremost, and has a small downwards pointed lobe beneath the anterior angle of the orbit. The lower jaw has on each side a single series of 10 to 12 distant teeth, horizontally placed and bent upwards. The first on each side of the symphysis is placed a little behind the rest, and it is the smallest ; the succeeding four gradually increase in length ; the two last are the longest of the series, which terminates with the anterior half of the jaw, and considerably in front of the teeth of the upper jaw. The tongue is very

narrow, almost linear, short, smooth, rounded in front and tied to the floor of the mouth. It is of a buff colour, but the cavity of the mouth is inky. The scales of the nape are very small and deciduous, so as to make the part appear naked; they gradually increase in size towards the posterior part of the body, where they are very large. They are orbicular with about 16 striæ. The body is compressed, the profile gradually narrowing towards the tail. The first dorsal ray is situated at the second third of the total length: its height is about $\frac{1}{2}$ of the vertical diameter at the nape; the succeeding, undivided, rays gradually increase towards the 5th, which, as well as the 6th, are about $\frac{2}{3}$ of the vertical diameter at the nape. The distance between the 5th and 6th, undivided, rays, and between the latter and the first branched ray is conspicuously greater than the distances between any of the preceding or following dorsal rays. The first branched ray is somewhat shorter than the 6th undivided, which produces a sinking in the upper margin of the connecting membrane, and indicates the transition from the undivided to the branched rays. The latter gradually increase in length towards the penultimate, which nearly equals the vertical diameter at the nape. The caudal is broad lanceolate, its length about $\frac{1}{2}$ of the total. The first undivided ray of the anal is situated opposite the 3rd branched dorsal; the height of the fin is slightly less than that of the dorsal. The papilla immediately behind the anus is short, conical. The ventrals are rounded, their length equalling the vertical diameter at the nape; the transversal diameter exceeding the latter by one third. The pectorals are pointed, their length $\frac{1}{7}$ of the total. It is not numerous at Pinang.

Although the dorsal fin is single, as it is in *Gobioides*, Lacépède, this species has the characteristic dentition of *Apocryptes*: it is in fact an *Apocryptes* with the two dorsal fins united, and as above observed, with the junction perceptible. The single character is of too little value to warrant the formation of a separate genus, particularly, as in *Apocryptes dentatus*, Cuv. and Val. (XII. 112) the membrane of the anterior dorsal is continued to the base of the second.

GEN. TRYPAUCHENA, Cuv. and Val. 1837.

Ventral fins united as in *Gobius*; the single dorsal, the caudal and anal united; on each side of the nape above the opercle a deep fossa.

TRYPAUCHENA VAGINA, (Bloch).

Gobius vagina, Bloch-Schn. 73, No. 20.

Gobioides ruber, Buchan. Ham., 38, 365.

Trypauchena vagina, Cuv. and Val. XII. 153, Pl. 351.

Trypauchena vagina, Swainson II. 279.

Trypauchen vagina, Richardson, Report 1845, 206.

Trypauchena vagina, Bleeker: Verh. Bat. Gen. XXII. 37, 5.

Rose-coloured with light blue reflections, paler towards the abdomen which is whitish; eyes minute, barely perceptible, like two blackish points; fins transparent, colourless.

D 6/47 to 49, C 17, A 1/49, V 1/5, P 17, Br. IV.

HABIT.—*Sea of Pinang.*

Sea, estuaries and freshwater of Bengal, Coromandel, Malabar, China Seas, Java, Madura, Balli.

TOTAL LENGTH: 8 inch.

Not numerous at Pinang.

GEN. AMBLYOPUS, Cuv. and Val. 1837.*

(PSILOSUM, Swainson, 1839).

Body elongated; ventrals like *Gobius*; dorsal, caudal and anal fins united; mouth vertical; in both jaws an external series of exposed, curved, distant teeth, longer than the rest; eyes very minute, hid by the skin, scarcely perceptible; no fossæ on the side of the nape.

AMBLYOPUS HERMANNIANUS, (Lacépède).

Tænioïde hermannien, Lacépède, IV. 533.

Cepola hermanniana, Shaw, IV. 191.

Cepola cæcula, Bloch-Schneider, 241, Tab. 54.

Gobioides rubicundus, Buchan. Ham., 37, 365, Pl. V. Fig. 9.

Tænioides, Cuv. R. A. II. 244.

Amblyopus hermannianus, Cuv. and Val. XII. 159, Pl. 350.

Psilosomus, Swainson, II. 183.

Amblyopus hermannianus, Swainson, II. 279.

Head and back brownish ochre; sides brick-red, paler on the abdomen, fins reddish ochre, caudal in some blood coloured.

D 6/44, C 15, A 1/45, V 1/5, P 15, Br. V.

Buchanan Ham.: D 46, A 40, V 12.

* Substituted for *Tænioides*, Lacépède 1800, the definition of which, M. Valenciennes observes, is incorrect, and not complete.

Cuv. and Val. : D 6/40, C 15, A 1/37, V 1/5, P 15.

HABIT.—*Sea of Pinang.*

Estuaries and freshwater of Bengal, Rangoon, Tranquebar.
Peiho river.

TOTAL LENGTH : 1 ft. 2 inch.

The height at the nape is from $\frac{1}{18}$ to $\frac{1}{17}$ of the total length ; the length of the head is $\frac{1}{7}$ to $\frac{1}{8}$ of the total ; the length of the pectoral fin is $\frac{1}{27}$ to $\frac{1}{25}$ of the total, and $\frac{1}{3}$ of that of the ventrals. It is of no common occurrence at Pinang.

GEN. PERIOPHTHALMUS, (*Bloch-Schn.* 1801) *Cuv. and Val.* 1837.

Profile rapidly sloping at an obtuse angle where the eyes are situated ; the latter are very close to each other, provided with a lower lid capable of covering the eye. Ventral fins in some entirely united, in others partially at the basal half ; pectorals muscular at the base, covered with scales and appearing as if supported on arms. Teeth of both jaws in a single series, more or less horizontally placed.

PERIOPHTHALMUS SCHLOSSERI, (Pallas).

Gobius schlosseri, Pallas, *Spicil.* VIII. Pl. 1, Fig. 1—4.

Gobius schlosseri, Linné : *Syst.* 1201.

Gobius schlosseri, Lacép. II.

Periophthalmus schlosseri, Bloch-Schn.

Gobius schlosseri, Shaw IV. 246.

Gobius schlosseri, Raffles : *Linn. Tr.* XIII.

Periophthalmus schlosseri, Cuv. R. A. II. 245 (*).

Periophthalmus schlosseri, Bennett : *Life of Raffles.*

Periophthalmus schlosseri, Cuv. and Val. XII. 192.

Periophthalmus schlosseri, Swainson, II. 280.

Periophthalmus schlosseri, Bleeker, *Verh. Bat. Gen.* XXII. 39.

Ikan lāsah, * lāsah, or lāsah of the Malays.

Upper part of the head and back blackish green or olive, cheeks and sides greenish gamboge, the scales with blackish edges and a large blackish spot at the upper angle of the opercle ; throat and abdomen white. Anterior dorsal shining reddish brown, the upper margin whitish ; second dorsal : upper margin and basal half brownish white, in the middle a broad obliquely upwards turned black band ; posterior

* *Lāsah*, restless.

part of the pectorals and caudal black; anal and ventrals whitish. Iris black with a narrow internal golden ring; eyes strongly iridescent.

D 8—1/12, C 16 $\frac{6}{8}$, A 1/12, V 1/5, P 17, Br V.

HABIT.—*Estuaries of Pinang, Malayan Peninsula, Singapore.*

Amboina, Sumatra, Java.

TOTAL LENGTH: 10 $\frac{1}{8}$ inch.

Some individuals have on one or both sides of the symphysis of the upper jaw a second, internal, short series of two or three small teeth. At Pinang this species occurs in great numbers in the moat of Fort Cornwallis, which is filled by each tide from the sea. Like the other Gobies it is very wary and difficult to capture, but unlike most of the others, it is very fierce when taken, and is capable of inflicting rather severe wounds with the long hooked teeth.

GEN. BOLEOPHTHALMUS, *Cuv. and Val.* 1837.

Differs from *Periophthalmus* in having all or the middle teeth of the upper jaw straight and strong; those of the lower jaw placed horizontally, all very fine, except two stronger than the rest, recurvously, and placed a little inwards; head more oblong than *Periophthalmus*; scales small or imperceptible; anterior dorsal fin with five rays; the base of the pectorals not in all species covered with scales.

BOLEOPHTHALMUS BODDAERTI, (Pallas).

Gobius boddaerti, Pallas, *Spicil. Zool.* VIII. 11, Tab. 2, Fig. 4, 5.

Gobius boddaerti, Linné: *Syst.* 1201.

Eleotris boddaerti, Bloch-Schn. 66.

Gobius striatus, Bloch-Schn. 71, Tab. 16. (*Female*, Cuv. and Val.)

Russell LIV. *Nettee Kunla Mottah.*

Gobius boddaerti, Shaw IV. 238.

Gobioides boddaerti, Cuv. R. A. II. 244 (').

Boleophthalmus boddaerti, Cuv. and Val. XII. 199.

Boleophthalmus boddaerti, Richardson, Report 1845, 208, 319.

Boleophthalmus boddaerti, Tem. et Schl. *Fauna Japon.* 148, Tab.

LXXVI. Fig. 3.

Boleophthalmus boddaerti, Bleeker: *Verh. Bat. Gen.* XXII. 40, 5.

Lips, upper part of the head and the back blackish green; sides greenish gamboge; abdomen white; the sides from the second dorsal with 6 or 7 obliquely backwards directed blackish bands, (not reaching

the abdomen); the whole body, pectorals and caudal with numerous verdigris spots; anterior dorsal pale brownish lilac with violet spots, the upper margin between the first four rays whitish; second dorsal brownish, whitish towards the base, between the rays two or three transversal violet bands edged with white, forming irregular transversal series; caudal with blackish rays; anal and ventrals whitish; pectoral membrane blackish. Eyes black, strongly iridescent.

D 5—1/24 to 26, C 16, A 1/25, V 1/5, P 19, Br. V.

HABIT.—*Estuaries and Sea of Pinang, Malayan Peninsula.*

Madura, Borneo, Java, Sea of China and Japan, Moluccas,
Bengal, Coromandel, Malabar.

TOTAL LENGTH: 5 inch.

At Pinang the species is very numerous in the same localities as *Periophthalmus schlosseri*.

BOLEOPHTHALMUS PECTINIROSTRIS, (Linné.)

Gobius pectinirostris, Linné: Chinens. Lagerstr.—Amoen. Acad.
Dec. 1754.

Apocryptes chinenses, Osbeck: It. 130.—Amoen. Acad. IV. Pl. 3,
Fig. 3.

Gobius pectinirostris, Linné: Syst. 1200.

Gobius pectinirostris, Lacép. II. 542.

Gobius pectinirostris, Shaw IV. 245.

Apocryptes pectinirostris, Cuv. and Val. XII. 150.

Boleophthalmus pectinirostris, Richardson Report 1845, 208.

Head and back greyish green, lighter on the sides; abdomen whitish; the whole body with minute blackish tubercles, and with metallic sky-blue or verdigris spots; muzzle, lips, throat and posterior margin of the opercle pale greenish black; anterior dorsal greenish black with numerous vertically placed lilac spots; posterior dorsal greenish black with 6 or 7 transversal series of elongated lilac, black-edged spots, which between the 8 posterior rays become larger, but rarer; caudal brownish black with transversal series of indistinct lilac spots; anal, ventral and pectoral fins brownish; the base of ventrals greenish black, the anterior scaly part of the pectorals with a blackish crescent-shaped margin. Iris narrow golden; pupil strongly iridescent.

D 5—1/25, C 16 $\frac{2}{3}$, A 1/25, V 1/5, P 20, Br. V.

HABIT.—*Sea coast of Pinang.*

Canton.

TOTAL LENGTH : 6 inch.

The length of the head is a little more than $\frac{1}{2}$ of the total length, the height slightly exceeds the breadth and equals half the length. The vertical diameter at the anterior dorsal is $\frac{1}{2}$ of the total length. The muzzle is rounded, the gape wide, the angle of the mouth is opposite the posterior angle of the orbit. The eyes are contiguous, situated a little behind the second fifth of the head; upper eyelid with tubercles; the lower membranous, hemi-transparent. The upper jaw has on each side of the symphysis three conical teeth, distant, and longer than the rest, of which there are upwards of 30 very minute, and distant, on each side. On the upper lip behind the canines appears a small flattened lobe. Each side of the lower jaw carries 30 to 34 horizontal, closely set teeth, which are long, almost setaceous, obliquely truncated at the apex. On each side of the symphysis, on a more inward level than the others, is a stronger, conical, vertical tooth. The tongue is small, rounded, fleshy, and fixed to the floor of the cavity, and as well as the latter inky. The anterior dorsal commences a little behind the root of the pectoral; the four posterior rays are filamentous: the third, the longest, is little less than $\frac{1}{3}$ of the total length; the fifth, a little shorter than the first, equals about one half of the third; the membrane extends close to the posterior dorsal; the base of this fin equals the greatest vertical diameter of the body. The posterior dorsal slightly increases in height towards the 21st ray, which measures about $\frac{2}{3}$ of the greatest vertical diameter of the body; the base of the fin is $3\frac{1}{2}$ times its height. The caudal is a little pointed, the length little less than $\frac{1}{3}$ of the total. The anal commences opposite the second branched ray of the posterior dorsal, the tract of which it follows, but its height is less by one third; the 23rd ray is the longest and less than one half of the greatest diameter of the body. The ventrals are infundibuliform, their length is about $\frac{1}{3}$ of the total. Two thirds of the pectorals are covered with scales; their length is about $\frac{1}{2}$ of the total; the naked portion of this fin is oval. The scales resemble those of *B. boddaerti*, increasing in size on the abdomen and posterior part of the body, deeply imbedded in the integuments, which are covered with numerous papillæ. Single individuals were observed at Pinang.

BOLEOPHTHALMUS VIRIDIS, (Buchan-Ham.)

Gobius viridis, Buchan. Ham. 42, 45, 366, Pl. XXXII. Fig. 12.

Boleophthalmus viridis, Cuv. and Val. XII, 213.

Boleophthalmus histophorus, Cuv. and Val. XII, 210.

Scartelaos viridis, Swainson II, 280.

Head and back greenish ; sides bluish-slate coloured ; above the indistinct lateral line more or fewer distant black dots ; in some a varying number of blackish vertical lines ; the festooned lips, the throat and abdomen bluish white ; dorsal fins greenish grey edged with black, the posterior one dotted with black ; caudal similar, but the black dots forming a few undulating transversal lines ; anal and ventrals pale rose-coloured or whitish ; pectorals greyish with a few scattered black dots. Iris pale golden.

D 5—1/26, C 17, A 1/25, V 1/5, P 17, Br. V.

HABIT.—*Sea of Pinang.*

Estuaries of the Ganges, Bombay, Surat.

TOTAL LENGTH : 5 inch.

From comparison of a number of living individuals it appears that the deeper or lighter greenish colour of the back, and the absence or presence of vertical lines on the sides are but individual differences, perhaps influenced by age, sex, or habits. Buchanan Hamilton correctly observes "there are very minute scales on the body and upper part of the head." They are imbedded in the skin, distant, orbicular or slightly oval, and become larger towards the tail. On submitting a portion of the skin to 60 or 100 linear magnifying power, the scales may be seen distinctly enough. This species is very numerous at Pinang.

GEN. ELEOTRIS, Gronov. 1763.

General structure of *Gobius*, but the ventral fins are not united ; branchiostegous rays six.

ELEOTRIS POROCEPHALA, Cuv. and Val.

Eleotris porocephala, Cuv. and Val. XII. 237.

Head and back blackish brown ; sides brownish white with clouded brownish spots ; abdomen brownish white minutely dotted with brown ; anterior dorsal pale brownish ; posterior dorsal and caudal darker with indistinct transversal series of brownish spots, their free margin whitish ;

anal, ventrals and pectorals whitish hemi-transparent. Iris golden, more or less spotted with black.

D 6— $1/8$, C $17\frac{6}{5}$, A $1/7$, V $1/5$, P 15, Br. VI.

HABIT.—*Freshwater Pinang.*

Freshwater Seychelle Islands, New Ireland.

TOTAL LENGTH: $5\frac{4}{5}$ inch.

The pore a little above the posterior nostril, and that immediately behind the orbit are indistinct in the two young individuals examined; the uppermost of the four pores on the posterior ascending margin of the preopercle is distinct, the other three less so, confluent, forming a short sulcus.

ELEOTRIS OPHIOCEPHALUS, Kuhl and Van Hasselt.

Eleotris ophiocephalus, Cuv. and Val. XII. 239.

Head and back pale brownish black on a golden ground; sides with six parallel longitudinal brown lines; abdomen buff, minutely dotted with brown; dorsals brownish; the posterior and the caudal with indistinct transversal series of brownish spots, and with whitish margins; anal, ventrals and pectorals hemi-transparent, minutely dotted with brown. Iris golden blackish.

D 6— $1/8$, C $17\frac{5}{5}$, A $1/7$, V $1/5$, P 15, Br. VI.

HABIT.—*Sea of Pinang.*

Java.

TOTAL LENGTH: $5\frac{6}{5}$ inch.

From *E. porocephala* the present species principally differs in its colours: the head appears a little more elongated, the scales of the crown somewhat larger, and the inferior margin of the preopercle has but a single rather indistinct pore, near the angle of the mouth. It appears to be of rare occurrence at Pinang.

ELEOTRIS BUTIS, (Buchan. Ham.)

Cheilodipterus butis, Buchan. Ham. 57,367.

(Icon.) Cheilodipterus butis, Gray. Ill. Ind. Zool. II. Pl. 93,
Fig. 3

Eleotris humeralis, Cuv. and Val. XII. 246.

Eleotris humeralis, Bleeker: Verhand. Batav. Gen. XXII. 22, 5.

Reddish brown with dark central spots on some of the scales of the head and sides, and the latter with numerous vermilion spots; the two dorsals brownish at the base, transparent in the middle with

broad vermilion margins; caudal and anal black with vermilion margins; anal rays with similar spots; pectorals transparent; near the root, between the 8th and 16th ray, a large rounded black spot, above and below which a smaller vermilion spot, and a few others at the root of this and the ventral fins. Iris blackish golden.

D 6— $1\frac{1}{8}$, C $17\frac{5}{8}$, A $1\frac{1}{8}$, V $1\frac{1}{5}$, P 18, Br. VI.*

HABIT.—*Sea and estuaries of Pinang.*

Estuaries of Bengal, Batavia, Samarang, Surabaya, Pasuruan, West Coast of Madura.

TOTAL LENGTH: 6 inch.

It is readily recognised by the much depressed elongated head, the length of which is contained $3\frac{1}{2}$ times in the total; the greatest vertical diameter of the body slightly exceeds $\frac{1}{8}$ of the total length. The opercle is a little pointed above the root of the pectorals, which, however, is less perceptible in the young than in the adult. Although Buchanan Hamilton points out the strong affinity of this species to the Gen. *Gobiomorus*, Lacépède, he was led to consider it a *Cheilodipterus*. His specimen from the Ganges, figured in his unpublished drawings, and later by Mr. Gray, was destitute of the vermilion spots of the body, which vanish in individuals inhabiting muddy estuaries. These spots as also the scarlet margins of the fins, become obliterated after death, when the black spot of the pectoral fins appears surrounded by two smaller yellowish-white ones, as described by M. Valenciennes. (Hist. Nat. des Poiss. XII. p. 186.) It is not numerous at Pinang.

ELEOTRIS CAPERATUS, Cantor.

Ground-colours, the vermilion spots of the body and the margins of the fins, the black spots at the root of the pectorals exactly resembling those of *Eleotris butis*.

D 6— $1\frac{1}{8}$, C $16\frac{4}{8}$, A $1\frac{1}{8}$, V $1\frac{1}{5}$, P 21, Br. VI.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $3\frac{2}{8}$ inch.

The crown of the head is apparently scaleless as far as the posterior margin of the orbit; it is depressed, but less elongated than *E. butis*, its length being contained $4\frac{1}{2}$ times in the total; the opercles expansible and cleft as in *E. butis*. The muzzle is rounded, the gape nearly ver-

* Buchanan Hamilton gives by mistake 7 branchiostegous rays.

tical, the angle of the mouth opposite the anterior part of the orbit; the lower jaw scarcely longer than the upper; the teeth minute, velvety, the external and internal series of both jaws distant, somewhat longer than the rest; the tongue small, flattened, rounded in front; the eye oval, comparatively larger than in *E. butis*, occupying the second fourth of the head; the distance between both is about one vertical diameter. The upper margin of the orbit forms a sharp arched crest, armed with minute, close, forwards pointing spines; the crest itself is continued obliquely downwards, but becomes spineless in front of the orbit, and there it separates the rostral cavity in which the two nostrils open, from a short crescent-shaped cavity, immediately below the anterior angle of the orbit. Along the upper margin of the somewhat pointed preopercle proceeds a short, but rather deep, horizontal sulcus, which farther follows the tract behind the supraorbital spinous crest. The greatest vertical diameter of the body, at the commencement of the anterior dorsal fin, is a little less than the length of the head. The scales of the opercles, cheeks and the nape are a little smaller than those of the body, which are a little broader than long. The longitudinal series from the root of the pectorals to the caudal contains about 34 scales. The length of the pectoral fins equals that of the head; the other fins, as well as the genital papilla in shape and proportions resemble those organs of *E. butis*. The similarity of colours and their distribution is so striking in both species, that they might be mistaken, but for the supraorbital spinous crest, the sulcated, and comparatively shorter head of *E. caperatus*. Two individuals were observed at Pinang, taken together in stakes with other fishes.

SUBFAM. ECHENEIDINÆ.

GEN. ECHENEIS, ([*Artedi*,] *Linné* 1748), *Cuvier* 1817.

With a flattened disk on the head, composed of a certain number of transversal laminæ, directed obliquely backwards, dentated or spiny on their posterior margin, and moveable so that by creating a vacuum between them, or by hooking on by the spines, they are capable of attaching themselves to various bodies, such as rocks, ships, fishes, &c. Body elongated, covered with minute scales; a single soft dorsal opposite to the anal; head perfectly flat above; eyes lateral; mouth horizontally cleft, rounded; lower jaw projecting and as well as the inter-

maxillaries furnished with minute card-like teeth; a regular series of minute teeth like cilia along the margin of the upper maxillaries; branchiostegous rays eight; the stomach is a wide cul-de-sac; cæca six or eight; intestine ample, but short; air-vessel none.

ECHENEIS NAUCRATES, Linné.

Echeneis neucrates, Linné: Syst. Nat. 1188.

Echeneis neucrates, Forskål: Descr. Anim. p. XVI. No. 7.

Echeneis naucrates, Bonnat. Encyclop. Method. Ichthyol. Tab. 33.

Echeneis neucrates, Bloch. Tab. 171.

Fig. 124.

Echeneis neucrates, Shaw IV. 209, Pl. 31.

Echeneis neucrates, Russell XLIX. Ala Mottah.

Echeneis naucrates, Cuv. R. A. (Ed. I.) II. 228.

Echeneis neucrates, Bennett: Life of Raffles, 692.

Echeneis vittata, Rüppell: N. W. Fische, 82.

Echeneis naucrates, Richardson: Report 1845, 203.

Echeneis naucrates, Temm. et Schl. Fauna Jap. Tab. CXX. Fig. 1.

Guddimi of the Malays.

(*Adult.*) Disk, fins, and ground-colour of body livid or lead colour of different shades; from the muzzle over the side of the head a broad bluish black band, in some more or less continued along the lateral line; in some the throat and posterior half of the body bluish black; in others livid patches on the sides and abdomen; upper and lower corner of the caudal with a crescent-shaped or triangular milk-white spot. Iris silvery bluish black.

(*Young.*) Of darker colours than the adult; the elevated angles of the dorsal and caudal milk-white as also the angular spots on the trapezoidal caudal.

D $2\frac{2}{3}$ to 38, C $17\frac{5}{8}$, A $2\frac{2}{3}$ to 38, V $1\frac{1}{5}$, P 21 to 23, Br. IX.

Disks 23 to 26.

HABIT—*Sea of Pinang, Malayan Peninsula, Singapore.*

Atlantic on both sides, Red Sea, Indian Ocean, Bay of Bengal, Sumatra, Australia, Polynesia, Japan.

TOTAL LENGTH: 2 ft. 4 inch.

Single individuals occur at all seasons in the Straits of Malacca. The Malays consider this fish to be powerful manure for fruit trees. (Low: *Dissert. of Pinang*, 179).

FAM. BLENNIOIDÆ.

GEN. PETROSCIRTES, Rüppell 1828.

(OMOBRANCHUS, [Ehrenberg,] Cuv. and Val. 1836.—

BLENNECHIS,* Cuv. and Val. 1836.)

Teeth setaceous, minute, in a single series ; branchial opening very small, placed above the pectoral fins ; dorsal single, with flexible, but not articulated rays ; ventrals thoracic, with three rays.

PETROSCIRTES VARIABILIS, Cantor.

Head above and back light brownish olive ; sides of the head and body yellowish ; abdomen greenish yellow ; from the orbit to the caudal a longitudinal blackish band, above which the head and body minutely dotted and clouded with black ; dorsal yellowish olive, dotted with black, rays with more or less distinct blackish spots forming two or three longitudinal series ; in some individuals a black spot between the points of the first and second ray ; caudal yellow, base minutely dotted with black and in some with a central black spot ; anal yellow minutely dotted with black, in some with black spots on the rays forming two or three longitudinal series ; ventrals yellow ; pectorals transparent. Iris bright yellow clouded with blackish ; orbital margin olive.

D 11/17 to 20, C $11\frac{2}{3}$, A 17 to 21, V 3, P 15, Br. VI.HABIT.—*Sea of Pinang, Singapore.*

TOTAL LENGTH : 5 inch.

The form of the body is elongated, gradually compressed from the head to the tail ; the greatest vertical diameter of the body, in front of

* *Blennechis*, Cuv. and Val.—“ Branchiostegous membrane closed beneath and communicating externally by a small fissure above the base of the pectoral fins ; dentition a modification of that of *Blennius* : lower incisors, attached to the anterior part of the jaw ; on each side a long canine, in some species enormous, reclining ; in others arched, and when the mouth is closed, fitting in a cavity on each side of the palate ; dorsal undivided ; tentacles absent in most.” (Cuv. and Val. XI. 279).—Of the two species of *Petroscirtes*, described by Dr. Rüppell, *P. mitratus* is characterised as having in both jaws a single close series of fine setaceous teeth ; *P. ancylodon* as having in addition two small canines on each side of the upper jaw, and a very long one on each side of the lower. As M. M. Cuvier and Valenciennes admit both species in their Genus *Blennechis*, Dr. Rüppell's *Petroscirtes* claims priority.

the anal, is $\frac{1}{6}$ of the total ; of which that in front of the caudal is $\frac{1}{12}$. The vertical section at the occiput is nearly square, from thence the sides of the head are gradually compressed towards the truncated muzzle, the breadth of which is $\frac{1}{3}$ less than that of the occiput. The upper part of the head is flattened, gently declining to between the eyes, when it becomes arched and abruptly declining. The length of the head is $\frac{2}{3}$ of the total, the depth at occiput about $\frac{1}{2}$ of the length. The distance from the muzzle to the orbit is $\frac{1}{3}$ of the length of the head. The upper part of the orbit forms a part of the profile ; the diameter of the eye is $\frac{1}{4}$ of the length of the head. The mouth is rather large : as the jaws are truncated in front, they consist of a central and two lateral portions. The central or transversal supports a single close series of minute setaceous trenchant teeth : those of the upper jaw are placed vertically ; those of the lower, the shorter, horizontally. In the upper jaw their number varies from 30 to 40 ; in the lower from 32 to 50. The number appears to be independent of age : of two individuals measuring 5 inch. in length, one had $\frac{42}{50}$, the other $\frac{34}{39}$ incisors, while two others, about 3 inches in length, had $\frac{34}{40}$ and $\frac{30}{32}$. On each side of the lateral part of the upper jaw, a short distance behind the incisors, appears a small canine. A much longer canine, equalling the diameter of the eye, is placed on each side of the lower jaw immediately behind the incisors. When the mouth is closed each of the lower canines is received into a large oval cavity in the palate. Behind the canines the jaws are toothless. There is no tongue ; under the throat are two excessively minute filaments. Just above and a little in front of the root of the pectorals appears a short crescent-shaped fissure, the opening of the gills. On the upper part of the head are several pores, of which one above the anterior part of each orbit, appears to be constant. The body appears to be naked with numerous minute pores secreting mucus. The lateral line proceeds from the posterior part of the opercle obliquely upwards to about the fifth dorsal ray, from whence it follows close to the base of the fin towards the eleventh ray, when it turns for a short distance obliquely downwards and suddenly terminates. The dorsal fin commences on a line with the posterior margin of the preopercle ; the first ray is a little shorter than the rest, which are nearly equal, $\frac{2}{3}$ of the greatest diameter of the body. The dorsal, like all the other fin rays, are undivided, but the first 11 dorsal are simple, not jointed ; the last one is connected

by a triangular membrane to the posterior part of the back. The caudal equals the length of the head; when spread out, the posterior margin is rounded with the points of the rays exposed, but ordinarily the fin appears lanceolate. The anal commences opposite the twelfth dorsal ray; it resembles the dorsal, but the rays are a little shorter; the last one is connected by a membrane to the posterior part of the abdomen. The pectorals are rounded, $\frac{1}{8}$ of the total length. The ventrals consist of three rays, of which the anterior is the shortest; the central is the broadest, but its length equals the very thin posterior one, which is about $\frac{1}{8}$ of the total length. Single individuals occur at all seasons at Pinang. They resemble some of the *Gobioidæ* in their power of sustaining life for some time out of water, in their skipping movements, and in their habit of inflating the gill-membrane. The diaphragm is silvery white; the stomach capacious, generally expanded with minute crustacea; the liver small; the gall large, pyriform; the intestinal canal is simple, about the length of the fish; the air-vessel small, pyriform, silvery. This species is closely allied to *P. bankieri*, Richardson,* which, however, is readily distinguishable by its larger eye ($\frac{1}{3}$ of the head,) and by the third ventral ray being much shorter than the second.

FAM. LOPHIIDÆ.

GEN. ANTENNARIUS, (Commerson) Lacépède 1798.

(CHIRONECTES,† Cuvier, 1817).

Head compressed with three free rays on the crown; mouth vertically cleft; opening of the gills small, round, behind the pectoral fins, in the posterior part of axilla. Tongue toothless. Intermaxillaries, lower jaw, vomer, palatines and pharyngeals with minute card-like teeth. Dorsal fin elongated.

ANTENNARIUS RANINUS, (Tilesius).

Klein: Miss. III. Pl. 3, Fig. 4?

Lophius histrio, Var C., Bloch-Schn., 142?

Lophius histrio marmoratus, Bl.-Schn. Ibid?

Lophius raninus, Tilesius: Mem. Mosc, XI. Pl. 16.

* *Ichthyology of the Voyage of H. M. S. Sulphur*, 136, Pl. LXIV. Fig. 8, 9.
—*Report* 1845, 266.

† *Chironectes*, Illiger. 1811, a genus of *Marsupialia*.

Lesson : Voy. de la Coquille. Poiss. Pl. 16, Fig. 2.

Chironectes marmoratus, Cuv. and Val. XII. 402.

Chironectes raninus, Richardson, Rep. 1845, 203.

Chironectes marmoratus, Temm. and Schl. Fauna Jap. Pisc. 159,
LXXXI. Fig. 1.

Ground colour of back, sides and fins yellow ochre, largely marbled with blackish brown, in which occur single darker spots; abdomen silvery yellowish-white with brown spots; the cutaneous filaments of the fins and back blackish, those of the sides pale yellow, those of the abdomen white. Iris pale burnished golden with distant radiating brown lines; pupil circular, black.

D 3—12, C 9, A 7, V 5, P 10, Br. VI.

HABIT.—*Sea of Pinang.*

New Guinea, Bombay, Japan.

TOTAL LENGTH: $4\frac{2}{8}$ inch.

The body is minutely granulated, and the first dorsal ray is excessively slender: it was absent in the larger of two individuals observed at Pinang.

ANTENNARIUS HISPIDUS, (Bloch-Schn.)

Koehlreuter, N. C. Petrop. X. Pl. 8, Fig. 1.

Lophius hispidus Bloch-Schn. 143, No. 6.

Lophius striatus, Shaw, Nat. Misc. V. Pl. 175.

Russell XIX. Kappa Mura Moia.

Lophius histrio, Linné, Russell.

Chironectes lophotes, Cuvier : Mém. du Mus. III. Pl. 17, Fig. 2.

Chironectes hispidus, Cuv. and Val. XII. 407.

Pale reddish yellow (nankin-colour), paler on the abdomen; head and back with transversal sooty brown stripes: those of the nape and back nearly transversal or slightly oblique, radiating obliquely downwards from the eye and from the tail; all the fins except the ventrals spotted with sooty brown; first dorsal ray yellowish alternately brown; the tuft of filaments longitudinally blackish and white; the few short filaments of the body, the lips, tongue, and cavity of the mouth pale yellowish. Iris pale burnished golden with radiating brown lines; pupil black, circular.

D 3—12, C 9, A 7, V 5, P 10, Br. VI.

HABIT.—*Sea of Pinang, Singapore.*

Bay of Bengal.

TOTAL LENGTH: 9 inches.

The body and fins are covered with small, closely set, bipartite spines which rise vertically from the skin. The lateral line is composed of larger somewhat distant spines, each terminating in 6 to 9 points; it commences from the muzzle, proceeds in an arch above the eye and continues following the slope of the back towards the posterior part of the second dorsal. A second, rather indistinct line of distant, larger spines is observed on the upper half of the upper jaw, and a third similar marks externally the posterior margin of the opercle. Here and there on the body, but particularly towards the anterior part of the abdomen, appear some short fleshy filaments. The larger individual was observed at Singapore in May 1840, a second, 4 inches in length, at Pinang in 1845. The stomach is conical, very capacious, occupying the entire length of the lower part of the expansible abdominal cavity; the coats are very thick, leathery; the internal surface with numerous irregular folds. The duodenum, the widest of the intestines, receives the elongated ductus coledochus at a distance of about $\frac{3}{8}$ inches from pylorus. The length of the intestinal canal is double that of the fish. The liver is very voluminous, elongated; the gall bladder is like a pea, half imbedded in the liver; the spleen very minute. The air-vessel large, oval; the coats very thick.

ANTENNARIUS COMMERSONI, (Lacépède).

Renard I. Pl. 43, 212?

Lophius commersonii, Lacépède I. 327.

Lacépède I. Pl. 14, Fig. 3?

Chironectes commersonii, Cuvier : Mém. du Mus. III. 431, Pl. 18,

Fig. 1.

Chironectes commersonii, Cuv. and Val. XII. 426.

Bluish black. On the back, above the lateral line, and in front of the first articulated ray an oblique rose-coloured oval spot, within which a black ring; at the root of the caudal, above and below two similar smaller spots, and one on the side between the pectoral and anal fins. First very slender dorsal ray alternately rose-coloured and black, the tuft of filaments rather full, blackish grey. Rays of the dorsal, anal, pectoral and ventral fins black, the membranes inky with a rather broad sub-marginal rose-coloured band, edged with black.

The points of the ventral rays rose-coloured. The caudal rays black ; between the third and ninth, near the root, the black membrane has a transversal rose-coloured band divided in the middle by a black line. On the posterior part of the caudal a broad sub-marginal rose-coloured band, within which four somewhat undulating black lines, edged with black. Lips, throat, tongue, and cavity of the mouth light bluish gray, dotted with black. Iris rose-coloured silvery, with six radiating black lines, pupil circular, black.

D 3—14, C 9, A 7, V 5, P 9, Br. VI.?

HABIT.—*Sea of Singapore.*

Isle of France.

TOTAL LENGTH : $5\frac{7}{8}$.

The body and fins are covered with small black spines like those of *A. hispidus*, but there are no fleshy filaments. The lateral line is continued to the root of the caudal fin. The abdomen is very expansible. The present differs from the description given by Cuvier and Valenciennes in the position and number of the rose-coloured spots or ocelli, and the anal fin has one ray less, differences sufficiently insignificant to be considered individual. A single individual was observed at Singapore in May 1840.

GEN. BATRACHUS, Klein 1744.

Head broad ; mouth widely cleft, lips frequently with numerous cutaneous filaments ; anterior dorsal fin very small and almost hid by the integuments ; pectorals supported by flat short arms ; ventrals jugular with three rays of which the anterior is elongated, flattened like a sword-blade ; teeth in the jaws, vomer and palate ; posterior dorsal and the anal extensive, but low ; sub-opercle as large as opercle, both terminating in strong spines ; infraorbitals none ; branchiostegous rays six.

BATRACHUS GRUNNIENS, (Linné).

Seba III. Pl. 28, Fig. 4.

Cottus grunniens, Var. B. Linné : Mus. Ad. Fr. II. 65.

Cottus grunniens, Linné, Var. B : Syst. 1209.

Cottus grunniens, Bloch, Pl. 179.

Cottus grunniens, Lacép. III. 232.

Batrachus, Bloch-Schneider, 42.

Cottus grunniens, Shaw IV. 256.

Batrachus grunniens, Cuv. R. A. II. 253. (?).

Batrachoides gangene, Buchan. Ham. 34, 365, Pl. XIV. Fig. 8.

Batrachus grunniens, Cuv. and Val. XII. 466.

Head above, back and sides light greenish or brownish olive, abdomen greenish or brownish white; head marbled and spotted with black; body with more or less distinct oblique and vertical broad bands, darker than the ground-colour, edged and spotted with black; fleshy filaments buff; fins of the ground-colour of the body, dorsals and anal indistinctly clouded with black or with very oblique blackish bands; caudal, pectorals and ventrals with blackish spots or narrow vertical bands. Iris narrow silvery olive, orbital part blackish.

D 3—22, C $13\frac{2}{2}$, A 18, V $1\frac{1}{2}$, P 23, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Java, Bombay, Gangetic estuaries.

TOTAL LENGTH: 10 inch.

The length of the head is about $\frac{1}{4}$ of the total; the transversal diameter of the orbit is $\frac{1}{8}$ of the length of the head. The eyes are placed nearly horizontally, their distance from the muzzle is one diameter, from each other it is somewhat less than two transversal diameters. The intermaxillary teeth are minute, placed in a double series, which reaches from the symphysis to opposite the eyes. A double series of stronger conical teeth occupies the vomer and palatals, and extends farther back than the intermaxillaries. The lower jaw has a double series of strong conical teeth on the symphysis, but it becomes single in the branches of the jaw. The tongue is bouy, small, flattened, elongated and so completely hid in the integuments that it cannot be perceived during life. The opercle terminates in two strong spines of which the superior points obliquely upwards and backwards, the lower is horizontal. The sub-opercle terminates in a single horizontal spine, in length equalling the lower one of the opercle. A number of fleshy filaments terminating in cilia are scattered over the head. One behind each eye, and at the angle of the mouth is longer than the rest. The greatest vertical diameter of the body equals the length of the head. The ventral spine is very short and by a membrane closely joined to the first ray which is the longer and undivided. The second ray is shorter and divided in numerous branches. Single individuals occur, but rarely, at Pinang. The natives attribute poisonous qualities to these fishes, and reject them even as manure. The creaking sound they emit has been noted by Buchanan. They are capable of living a considerable time out of their element.

FAM. TEUTHIDIDÆ.

GEN. TEUTHIS, Linné 1766.

(SIGANUS, *Forskål* 1775.—CENTROGASTER, *Houttuyn*.—AMPHACANTHUS, *Bloch-Schneider* 1801.—BURO, [*Commers.*] *Lacépède*, 1803.)

Body oval, compressed; mouth slightly cleft and little protractile; teeth minute, crenulated, in a single series; a horizontal spine in front of the dorsal fin; ventrals with two spines: an external and an internal, between which three rays; branchiostegous rays five, of which the lowest is dilated and hid in the isthmus.

TEUTHIS JAVA, Linné.

Gronov. Zoophyl. 113, No. 352, Pl. 8, Fig. 4.

Teuthis java, Linné: Syst. 1362.

Russell CII. Worahwah.

Teuthis javus, Cuv. R. A. II. 223, (²).

Amphacanthus javus, Cuv. and Val. X. 118.

Amphacanthus javus, Schlegel et Müller: Verhand. over de Nat. Gesch. (Amphacanthus) 10.

Amphacanthus javus, Bleeker: Verh. Batav. Gen. XXII. 5.

Ikan kítang of the Malays.

Head above, back and sides dark brownish neutral tint, paler towards abdomen; on the head and back numerous pale bluish grey rounded spots, which on the sides and chest become elongated, irregular, vermiculated; on the abdomen longitudinal and whitish; sides of the head metallic greenish yellow or sulphur-coloured; cheeks washed with brown; pectorals transparent greyish white; rest of the fins pale brownish grey closely dotted with brown, and washed with brown, pale orange and lilac. Iris pale metallic sulphur-coloured; orbital half dark brown or neutral tint.

D 13/10, C 17 $\frac{10}{16}$, A 7/9, V 1/3/1, P 18, Br. V.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Sunda, Java, Madura, Coromandel.

TOTAL LENGTH: 11 inch.

The length of the head is a little more than $\frac{1}{3}$ of the total, in which the depth at occiput is contained 3 $\frac{1}{2}$ times. The greatest diameter of the orbit, which is a little oblique and falling beneath the widened

crenulated anterior margin, is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body is $2\frac{1}{2}$ in the total length. The horizontal spine in front of the first dorsal has in the young of this and of the following species the point exposed; with age it becomes entirely hid by the integuments. In young individuals the length of the head is from $4\frac{1}{2}$ to $4\frac{2}{3}$ in the total; the greatest diameter of the orbit is $2\frac{3}{4}$ in the length of the head; the greatest vertical diameter of the body is $2\frac{2}{3}$ in the total length. At Pinang small individuals are numerous at all seasons. As all the species of the present genus are supposed by the Malays of the Straits to be highly poisonous, they are not eaten, but set aside among offal of fish to be used as manure.

TEUTHIS CONCATENATA, (Cuv. and Val.)

Amphacanthus concatenatus, Cuv. and Val. X. 127.

Kítang of the Malays.

Head above, back and anterior part of the sides above the lateral line blue purple; rest of the sides reddish yellow; abdomen reddish white; back and sides with numerous rounded brick-red spots becoming reddish yellow on the lower part of the sides; sides of the head reddish yellow bronze washed with brown; nostrils, infraorbitals and opercles brimmed with cobalt; pectorals transparent; rest of the fins pale brownish grey, closely dotted with brown, washed with pale reddish yellow and lilac; between the dorsal and anal rays some indistinct brown spots. Iris narrow sulphur-coloured round the pupil; rest brown bronze.

D 13/10, C $17\frac{7}{7}$, A 7/9, V $1\frac{1}{3}/1$, P 17, Br. V.

HABIT.—*Sea of Pinang.*

Isle of Buru, Batavia.

TOTAL LENGTH: $6\frac{4}{8}$ inch.

The length of the head is $4\frac{1}{3}$ in the total, the depth at occiput $3\frac{1}{2}$. The greatest oblique diameter of the orbit is $2\frac{1}{2}$ in the length of the head. The outline of the head is convex, particularly between the eyes. The greatest vertical diameter of the body is $2\frac{1}{2}$ in the total length. When the caudal fin is spread out, the posterior margin is nearly straight. Single individuals occur at Pinang at all seasons.

TEUTHIS DORSALIS, (Cuv. and Val.)

Amphacanthus dorsalis, Cuv. and Val. X. 143.

Amphacanthus dorsalis, Schlegel and Müller: l. c. 10, 13, Tab. 2,
Fig. 1.

Kítang of the Malays.

Head above and back pale brownish olive, lighter on the upper half of the sides; lower half and abdomen bluish white; immediately beneath the origin of the lateral line and in front of the pectorals pale reddish lilac; back and sides with numerous small oval bluish white spots; cheeks and opercles pale metallic sulphur-coloured, opercles edged with pale lilac; pectorals transparent; caudal pale brownish olive, minutely dotted with brown; rest of the fins greyish white, tinged with lilac, minutely dotted with brown. Iris yellowish white, orbital margin olive.

D 13/10, C $17\frac{9}{10}$, A $7\frac{9}{10}$, V $1\frac{3}{4}$, P 16, Br. V.

HABIT.—*Sea of Pinang.*

Batavia.

TOTAL LENGTH: 6 inch.

The length of the head is $4\frac{1}{2}$ in the total. The greatest, oblique, diameter of the orbit is $\frac{1}{3}$ of the length of the head. The greatest vertical diameter of the body is $\frac{1}{3}$ of the total length. At Pinang this species is numerous at all seasons.

GEN. ACANTHURUS, *Forskål* 1775.

(HARPURUS, *Forster* 1778.—ASPIDURUS, *Lacép.* 1802.)

Tail on each side armed with a strong moveable spine; head and body compressed; eyes elevated; mouth slightly cleft; teeth in a single series, trenchant, with crenulated margins; dorsal single; body covered with minute scales; branchiostegous rays five.

ACANTHURUS XANTHOPTERUS, Cuv. and Val.

Plate IV.

Acanthurus xanthopterus, Cuv. and Val. X. 215.

Young. Head and body violet brown, paler towards abdomen; the nostrils opening in a bright gamboge triangular spot, resting behind on the anterior half of the orbit, the apex towards the middle of the

profile; dorsal fin bright yellow, minutely dotted with brown; along the base a cobalt blue longitudinal band, above which a second parallel lilac one terminating on the anterior third of the fin; a third and a fourth above each other: both bifurcating about the anterior half; upper margin black; anterior half of caudal white, the rest brown like the body; posterior margin broad, black; anal bright yellow minutely dotted with brown, with a cobalt blue basal band, above which four parallel lilac ones, external margin black; ventral spine and rays pale bluish black; membrane pale grey minutely dotted with brown; pectoral rays yellow, membrane transparent. Iris narrow, yellow round the pupil, next broad silvery white, orbital margin reddish brown.

D 9/27, C $17\frac{6}{4}$, A $3\frac{2}{5}$, V $1\frac{1}{5}$, P 17, Br. V.

HABIT.—*Sea of Pinang.*

Seychelles.

TOTAL LENGTH: $5\frac{4}{8}$ inch.

The length of the head is $4\frac{1}{2}$ in the total; the diameter of the eye is $3\frac{1}{2}$ in the length of the head. The preopercle, opercle, scapular and humeral bones are distinctly radiated. In each jaw is a single series of 16 trenchant teeth: those of the upper appear somewhat larger and their margin has from 10 to 12 crenulations (Fig. 3. Magnif.); in the lower jaw the pair of teeth on the symphysis is longer than the rest, and the whole of the margin carries 10 crenulations; all the rest are shorter, truncated with about 5 crenulations. The greatest vertical diameter of the body (Fig. 2.) is $2\frac{1}{2}$ in the total length. The whole of the head and body, the anterior half of the caudal and the base of the dorsal and anal fins, are covered with small elongated oval scales (Fig. 4. Magnif.), of which those of the body have the posterior part truncated with about 12 unequal cilia on the margin. The lateral line appears like a thread at the upper fifth of the body; it is slightly undulating, following the outline of the back, which is less arched than that of the abdomen, till it arrives between the terminations of the dorsal and anal fins. From thence it is at first a little downwards arched and then rises, so as to pass above the spine of the tail towards the caudal. Above and below the lateral line appear a number of short, excessively minute, backwards directed tubes. The length of the spine is less than the diameter of the eye; the anterior margin is sharp, the posterior rounded. The posterior margin of the caudal is slightly concave; the superior

lobe a little longer than the inferior. The stomach is short, thick, gizzard-like; the gall very large. There are four cœcopyloric appendages. The intestinal canal is spirally folded, more than twice the length of the fish. A single young individual was observed at Pinang in March 1845. The fishermen asserted that it is of rare occurrence, and attains to a foot in length.

FAM. AULOSTOMATIDÆ.

GEN. CANNORYNCHUS,* *Cantor.*

(*Equivalent to FISTULARIA, Linné, 1766.*)

Mouth tubular, elongated, depressed; jaws slightly cleft, nearly horizontal, with small teeth; head elongated from $\frac{1}{3}$ to $\frac{1}{4}$ of the total length; body elongated depressed; scales invisible; behind the head, above and below, some bony appendages casing the anterior part of the head, dorsal fin single, and as well as the anal composed of undivided rays; branchiostegous rays seven.

CANNORYNCHUS IMMACULATUS, (Commerson.)

Russell, CLXXIII. Goorum.—*Fistularia tabacaria*, Lin.

Fistularia tabaccaria, White, Voyage Bot. Bay. P. 296, Fig. 2.

Fistularia immaculata, (Commerson,) Cuv. R. A. II. 267.(1)

Fistularia commersonii, Rüppell: Neue Wirbelth. Fische, 142.

Fistularia immaculata, Richardson, Rep. 1845, 247.

Young. Head above light greenish grey; upper half of opercles greenish olive minutely dotted with black, lower half as well as the under surface of the head and the abdomen whitish; sides of the body light slate grey; the lateral line bordered beneath by a pale silvery bluish white line; fins greenish hyaline; caudal filament brownish olive. Iris narrow golden round the pupil; the rest blackish silvery.

D 15, 16 or 17, C $13\frac{4}{5}$, A 14 or 15, V $1\frac{1}{5}$, P 15, Br. VII.

HABIT.—*Sea of Pinang.*

Indian Ocean, Coromandel, Mohila, (Red Sea.)

Length of the head :	0 ft.	$5\frac{1}{8}$ inch.
„ „ „ body to the root of caudal fin, ..	0 „	$8\frac{6}{8}$ „	
„ „ „ caudal filament,	0 „	$4\frac{4}{8}$ „	

TOTAL LENGTH : 1 ft. $6\frac{3}{8}$ inch.

* *Κάννη*, reed; *ρύγχος*, snout. Substituted for *Fistularia*, Linné, 1766, pre-occupied by *Fistularia*, Donati, 1750. (*Polypi.*)

The length of the head is $\frac{1}{3}$ of the length of the body, measured from the symphysis of the lower jaw to the point of the caudal fin. The tubular mouth, to the anterior margin of the orbit, is $2\frac{3}{4}$ times longer than the rest of the head. The horizontal diameter of the eye is $9\frac{1}{2}$ in the length of the head; the distance of the eyes across the forehead is $\frac{1}{3}$ of the diameter; the narrow forehead is widened by a transparent membrane extending along the upper margin of the orbit, and giving it an elongated oval shape. From the sides of the occiput proceeds a sharp crest of minute spines to the preopercle; the posterior and anterior part of the orbit are finely toothed, and the latter part has a short broad spine above and below. On each side of the tubular mouth, appears a sharp ridge, the posterior half of which is armed with small forwards directed spines. The lower jaw is longer than the upper, with a round protuberance at the symphysis. Both jaws have a single series of small, somewhat unequal, reclining teeth. A similar single series appears on each of the palatals, and from four to six on the anterior part of the vomer. Between the intermaxillary series of teeth and those of the vomer is extended a small crescent-shaped membrane. From the centre of the opercle proceed downwards two strong striæ and numerous finer ones radiate backwards. From the posterior part of the orbit radiate a number of lines backwards. Immediately behind the occiput commence a pair of elongated lanceolate bony plates, each contained about $5\frac{1}{2}$ times in the length of the body, forming in the middle of the back a slightly raised line. Behind the pectoral fins appears a shorter lanceolate bony plate, the upper margin of which joins the former pair of the back; the lower joins a larger also lanceolate plate, which on each side covers the anterior part of the abdomen. The latter pair of abdominal plates are turned up at the sides at a right angle; their lower surface is honeycombed and the anterior half of their lower margin leaves a central open space on the abdominal surface. The length of the pair of abdominal plates is $\frac{2}{3}$ of the dorsal. The length of the pectoral fins and the lobes of the caudal equal the horizontal diameter of the eye. The vertical diameter at occiput, as well as the greatest diameter of the body, is $\frac{3}{4}$ of the horizontal diameter of the eye. The breadth across the occiput equals the latter diameter. A vertical section of the head is broad rectangular; one of the anterior part of the body, in front of the dorsal, is nearly triangular; behind the

dorsal it is rhombic. The dorsal and anal fins commence opposite each other at the posterior fourth of the distance from the anterior part of the orbit to the point of the caudal lobes. The lateral line commences above the opercle; the anterior part, occupying the dorsal plates, is arched with the convexity towards the centre of the back, so that the lines of both sides describe the figure of an elongated hour-glass. At the termination of the lateral pair of bony plates the lateral line commences, following the centre of the side, above the bluish white line. The lateral line consists of a number of a linear tubes, deeply cleft at both ends; behind the dorsal fin the tubes change to very short, sharp bony ridges, which to the touch appear like spines. The ventral fins are very short situated in the centre between the muzzle and the point of the caudal lobes. The length of the elongated central caudal ray appears to be proportionally longer in the very young individuals; in the largest it was divided in two. Four individuals were observed at different seasons at Pinang;* they were examined sometime after death, and none of them exhibited the lateral series of blue spots noted by Dr. Rüppell.

ORDO ANACANTHINI.

FAM. PLEURONECTISIDÆ.

GEN. PLATESSA, *Cuvier*, 1817.

In each jaw a series of trenchant, obtuse teeth; frequently on the pharyngeals teeth like paving-stones; dorsal extending in front to above the upper eye, leaving, as well as the anal, a naked interval between themselves and the caudal; shape rhomboidal; most species have the eyes on the right† side; two or three small cœca.

Eyes and colour on the left side.

* Another species of the present family: *Amphisyle scutata*, Klein, was observed in great numbers at Singapore in May 1840. From 1842 to 1845 none occurred at Pinang, nor were the fishermen there acquainted with the fish.

† The terms *right* and *left*, or *dextral* and *sinistral* are applied to the species of this family, as to those of every other, while the fish is placed with the tail towards the observer, the dorsal fin upwards, and the anal downwards.

PLATESSA RUSSELLI.

(Icon.) *Platessa russelli*, Gray : Ill. Ind. Zool. Pl. 94, Fig. 2.

Ikan Siblah of the Malays.

Left side. Pale reddish- or yellowish-brown ; each scale with a vertical buff spot close to the dark brown posterior margin ; opercle and anterior third of abdomen pale bluish or neutral tint. Iris silvery, coloured like the body.

Right side. Buff or dust-coloured ; opercle and anterior third of abdomen pale bluish. Fins transparent, coloured like the body, but paler, minutely dotted with brown ; dorsal, caudal and anal with a few scattered indistinct brownish spots.

D 70 to 73, C $15\frac{2}{3}$, A 56, V 6, P 12, Br. VII.

HABIT : *Sea of Pinang, Malayan Peninsula, Singapore.*

TOTAL LENGTH : 1 ft. 1 inch.

Left side. The length of the head is $4\frac{1}{3}$ in the total. The upper orbit occupies the second-fourth of the head, close to the profile of the back without encroaching upon it ; it is oval ; the horizontal diameter, being $\frac{1}{4}$ of the length of the head, exceeds by $\frac{1}{3}$ that of the lower rounded orbit. Both are separated by a very narrow sharp ridge. The vertical distance from the centre of the inferior orbital margin of the lower eye to the margin of the lower jaw is $\frac{1}{3}$ of the length of the head. The posterior apertures of both nostrils are situated immediately in front of the orbits ; they are rounded and larger than the anterior ones. Of the latter the upper one appears to be a small puncture about midway in front between both orbits. The lower anterior aperture is situated obliquely in front of the posterior, close to the margin of the left upper maxillary. The latter bone is narrow, widened and obliquely truncated at the lower extremity. The angle of the mouth scarcely extends to the anterior part of the orbits. The margin of the mouth is exclusively formed by the elongated intermaxillaries, to which are confined the teeth. The latter are conical, blunt, slightly inwards arched and placed in a single series, of which the anterior four or five of each side are a little larger and more distant than the rest, which are minute and placed closely together. The teeth of the lower jaw are longer, fewer, and all with intervals. The tongue is linear, smooth. The opercles and cheeks are hid by scales. The form of the body is

oblong, the greatest vertical diameter, at the second-third of the total length, slightly exceeds $\frac{1}{3}$ of the total. The body is covered by upwards of 67 longitudinal series of scales, of which there are about 81 on a line between the gill-opening and the caudal. The scales are small rounded with about 15 radiating lines at the radical part; the posterior margin is closely ciliated. The lateral line consists of simple tubes. It commences at the lower margin of the lower orbit, ascends in the shape of the letter S to the upper extremity of the preopercle, then slightly descends to above the posterior angle of the opercle, when it suddenly rises describing a short arch, terminating above the point of the pectoral. From thence it proceeds straight along the middle of the side to the point of the posterior margin of the caudal fin. The dorsal fin commences opposite the anterior angle of the upper orbit; the distance from the muzzle equals the horizontal diameter of the upper eye. All the rays, except the three last ones, are undivided, and with a single series of small scales along the anterior margin; the points of the rays project a little beyond the membrane, so as to give the fin a fringed appearance. The longest rays are contained $2\frac{1}{2}$ times in the length of the head: they are situated at the commencement of the posterior half of the fin, the distance of which from the caudal is $\frac{1}{2}$ of that of the anterior ray from the muzzle. The root of the caudal is covered with small scales; the posterior margin is pointed in the centre, the two rays of which are the longest, $\frac{2}{3}$ of the head. The posterior four or five anal rays are divided; the rest are simple and resemble the dorsal. The extent of the base of the anal is about $\frac{1}{4}$ less than that of the dorsal. The left ventral is situated a little nearer the gill-opening than the anal; the two first rays are undivided; the second, the longest, is $\frac{1}{3}$ of the head, and extends to the second anal ray. The right ventral is a little farther back, the first ray commencing opposite the third ray of the left fin. The two upper pectoral rays are undivided; the third, the longest, slightly exceeds $\frac{1}{2}$ of the head. Single individuals occur at Pinang, at all seasons. They are eaten by the natives.

GEN. HIPPOGLOSSUS, Cuvier, 1817.

Fins resembling those of *Platessa*; form generally more elongated; jaws and pharynx with teeth, in most species strong and sharp.

A.—Eyes and colour on the right side.

HIPPOGLOSSUS ERUMEI, (Bloch-Schneider.)

Pleuronectes erumei, Bloch-Schneider.

Russell, LXIX. Adalah.

Hippoglossus erumei, Cuv. R. A. II. 340.(?).

Hippoglossus erumei, Rüppell : Atlas, 121.

Hippoglossus erumei, Rüppell : Neue Wirbelth, Fische, 84.

Ikan Siblih of the Malays.

Right side. Dull brownish- or greenish-grey ; anterior third of dorsal milk-white, minutely dotted with brown ; rest pale bluish brown, dotted with brown and washed with black ; caudal blackish with a broad, vertical, whitish band at the base ; anterior eighth of anal milk-white, rest like dorsal ; pectorals and ventrals hyaline, the latter minutely dotted with brown. Iris silvery, sending a number of vermicular diverging threads over the circular black pupil.

Left side. Brownish white, minutely dotted with brown.

D 48 to 53, C $15\frac{3}{5}$, A 35 to 39, V 6, P 14 or 15, Br. VII.

HABIT: *Sea of Pinang, Malayan Peninsula.*

Coromandal, Bay of Bengal, Estuaries of the Ganges,
Massauah.

TOTAL LENGTH: 1 ft.

Right side. The length of the head is $\frac{1}{4}$ of the total. The upper orbit is placed horizontally on the upper surface of the head ; its distance from the muzzle is $\frac{2}{3}$ of its longitudinal diameter, which is $\frac{1}{4}$ of the length of the head. A little below, and in front of the upper orbit, on the left side of the muzzle, appears the posterior circular aperture of the left nostril ; the anterior one is smaller, tubular and situated a little in front of the posterior. The right orbit is slightly shorter than the left, and is situated vertically on the left side of the head, bordering upon the upper maxillary. The circular pupils are protected by a number of vermicular silvery filaments which diverge from the upper margin of the iris. The distance between both orbits scarcely exceeds $\frac{1}{4}$ of their diameter ; each orbital margin is a little raised with a narrow intervening furrow. The apertures of the right nostril are situated immediately in front of the right eye, and resemble the corresponding of the left. The upper maxillary is elongated, widened and truncated

bowel. The linear elongated intermaxillaries form the margin of the mouth, and have two series of long, distant, arched teeth, each with a minute barb on the posterior part of the point. The teeth of the external series are fixed, but those of the internal are moveable, and may be laid down like those of *Saurus nehereus*, (Buchan. Hamilton). The teeth of the lower jaw resemble those of the upper, but they are more numerous; those of the inner series are a little longer, and those near the symphysis have an indistinct double barb. On each side of the palate appears a single series of small pointed teeth, and in young individuals, upwards of 4 inches in length, four to six similar on the vomer, which, however, very early disappear. The tongue is minute and smooth; on each side of the root rises a small cluster of minute pointed teeth, and similar appear at intervals on the rest of the hyoid. The angle of the mouth is situated opposite the posterior part of the left orbit. The greatest vertical diameter of the body, at the second third of the total length, slightly exceeds $\frac{1}{3}$ of the latter. The lateral line commences at the inferior margin of the lower eye, which it follows, and turning backwards over the upper margin of the opercle, it describes a low arch which terminates opposite the middle of the dorsal. From thence it proceeds straight along the middle, to the point of the posterior margin of the caudal. The line is a little raised, and is on each scale composed of three small tubes: a central, from which an upper and lower diverge backwards. The greatest vertical diameter contains from 55 to 57 series of scales; the lateral line, from the opercle to the root of the caudal, 69 to 71 scales. The scales are small rounded, with 12 to 15 radiating lines at the radical portion and indistinctly ciliated in the centre of the posterior margin. The dorsal fin commences behind the upper orbit at a distance of one longitudinal diameter, and terminates at an equal distance from the caudal. The 9 or 10 anterior rays are undivided; the longest, towards the middle of the fin, are $2\frac{1}{2}$ in the length of the head; all have at their anterior margin a series of small scales. The anal is $\frac{1}{5}$ shorter than the dorsal; the two first rays are undivided; in other respects it resembles the dorsal. The root of the caudal is scaly; the posterior margin is bluntly pointed in the centre, the two rays of which, the longest, are $\frac{3}{4}$ of the head. The right ventral is situated a little in front of the pectoral, much nearer the gill-opening than the first anal ray; the two

first rays are undivided ; the fourth, the longest, is $2\frac{1}{2}$ in the length of the head. The left ventral is placed a little farther backward. The pectorals are pointed, $\frac{1}{2}$ the length of the head. The stomach is very capacious, broad pyriform ; the intestinal canal is simple, about $\frac{1}{4}$ of the total length. Single individuals occur at all seasons at Pinang, and are eaten by the natives.

B.—Eyes and colour on the left side.

HIPPOGLOSSUS ERUMEI, VAR. A.

HABIT : *Sea of Pinaag.*

This is simply a *reversed, sinistral variety*, necessary, however, to distinguish as such from a second, differing in colours. The present attains to the size of the dextral, but at Pinang it is of rarer occurrence. Individuals of equal length differ in no characters except in such as are necessarily the consequence of *reversion*, such, for instance, as the left ventral fin being placed a little anterior to the right.

HIPPOGLOSSUS ERUMEI, VAR. B.

Russell, LXXVII. Nooree Nalaka C.

Hippoglossus nalaka, Cuvier, R. A. II. 340(*).

Left side. Ground colour pale brownish grey or white minutely dotted with brown ; a broad brownish black vertical band, extending from the jaws over the sides of the head and body to the root of the pectorals ; two similar on the sides of the body, and a fourth over the posterior part of the body and the tail ; the three last bands extending faintly over the corresponding parts of the dorsal and anal ; anterior half of caudal whitish dotted with brown ; posterior half brownish black ; rest of the fins and eyes like *H. erumei*.

Right side, like the *left* of *H. erumei*.

HABIT : *Sea of Pinang, Malayan Peninsula, Singapore.*

Coromandel.

Except in colours and being sinistral, the present variety agrees in every other character with *H. erumei*. Russell, indeed, observed the strong resemblance, but he imagined that in this variety the scales were smaller, and the lateral line carinated. Comparison of equal individuals of both shews no difference of the size of the scales, and the lateral line is equally raised in both. Russell describes the length as

being six inches. Of a number of individuals examined at Pinang and Singapore none exceeded $6\frac{4}{8}$ inches. It remains to be ascertained if this variety attains to the same size as *Var. A.*, or if it is merely a transient livery of certain young individuals of *Var. A.*

GEN. SOLEA, Klein 1748.

Eyes and colour on the right side; mouth distorted on the side opposite the eyes; minute crowded teeth in the half of both jaws opposite the eyes, the other half toothless; form of the body oblong; muzzle rounded and generally projecting beyond the mouth; dorsal commencing opposite or a little in front of the upper eye; caudal separated from dorsal and anal.

SOLEA HUMILIS, Cantor.

Right side. Pale umber-brown, minutely dotted with black, and with numerous small blackish spots; an indistinct larger one close below the middle of the base of the dorsal, and a second at the posterior third; two corresponding spots near the base of the anal; membranes of the fins pale brownish buff dotted with black, rays pale umber; on the caudal some indistinct blackish spots; near the point of the pectoral an oval-, and between the two lowest rays a linear black spot. Iris pale silvery.

Left side. Pectoral, ventral and short filaments about the mouth brownish white.

D 57, C $12\frac{4}{4}$, A 42, V 5, P 8, Br. VI.

HABIT: *Sea of Pinang.*

TOTAL LENGTH: $3\frac{2}{8}$ inch.

Right side. The form of the body resembles that of *Solea pegusa*, Yarrell,* but the vertical diameter is greater in the present. The length of the head is $5\frac{1}{3}$ in the total. The upper orbit, the larger, is situated in the centre between the angle of the mouth and the corresponding part of the dorsal, but much nearer the muzzle; the horizontal diameter is $\frac{1}{8}$ of the length of the head. The lower orbit is situated between the angle of the mouth and the posterior angle of the upper orbit, of which its horizontal diameter is $\frac{2}{3}$. The distance between the orbits slightly exceeds the horizontal diameter of the upper orbit.

* Zool. Journ. IV. 467, Pl. 16.—British Fishes: II, 260.

The whole of the head is covered with little scales like those of the body, rough to the touch. The tongue is minute, smooth, truncated triangular. The greatest vertical diameter of the body, at the end of the anterior third of the dorsal, is $2\frac{1}{2}$ in the total length. On the diameter may be counted 69 series of scales. The slightly raised lateral line continues straight from behind the upper part of the opercle to the caudal, a little nearer the back than the abdomen. It contains 85 scales, each with a minute central tube. The scales of the head and body are small, elongated tetragonal, the posterior margin rounded. On the radical part appear about nine radiating lines, some of which are divided in two; the centre of the posterior margin has upwards of thirteen cilia, although very fine, yet sufficiently strong to make the scales appear rough to the touch. The first dorsal ray commences on a level with the anterior angle of the upper orbit. The first nine rays are undivided; all are covered by an elongated pyramidal sheath of scales, consisting of two or three series, which extend to near the points of the rays, which project beyond the membrane. The longest rays, towards the middle of the fin, equal $\frac{1}{2}$ the length of the head. The anal resembles the dorsal, but has only the four anterior rays undivided. The caudal is rounded, equal the length of the head. The pectoral is pointed, $\frac{1}{2}$ the length of the head. The right ventral is very small, about $\frac{1}{3}$ of the pectoral, and the last ray is connected by a membrane to the first anal.

Left side. A little above and behind the symphysis of the upper jaw appears a small tubercle, through which is pierced a single minute nostril. The base of the dorsal as far as the nine first rays carries a few short soft filaments, some of which are scattered over the side of the head; they become more numerous and crowded towards the left angle of the mouth. This side of the jaws resembles the cipher **3**, there being at the angle a small pointed tubercle, directed inward. The teeth are very fine, crowded and hid to the point in the fleshy lips. The left ventral is longer than the right and not joined to the anal. A single individual was observed at Pinang in October 1842.

SOLEA OVATA, Richardson.

Solea ovata, Richardson : Report, 1845, 279.

Right side. Brownish ash-grey, minutely mottled with pale black-

ish, towards the base of the dorsal and anal three rounded, distant, black spots, edged with light grey; on the rest of the body a few scattered similar spots, also indistinctly ocellated; pectoral greyish at the base rest black; rest of the fins pale ash-grey minutely mottled with blackish. Pupil horizontally oval; iris pale silvery round the pupil; the rest ash-grey.

Left side. Brownish white; opercles and abdomen lead grey; filaments about the head white; fins buff.

D 65, C $12\frac{5}{4}$, A 48, V 5, P 9, Br. VI.

HABIT: *Sea of Pinang.*

China Seas, Canton.

TOTAL LENGTH: $3\frac{3}{8}$ inch.

Right side. The length of the head is $\frac{1}{3}$ of the total. Both eyes are nearly equal, $\frac{1}{3}$ of the length of the head; the upper one occupies the second-fifth; the lower is removed slightly farther back, and touches the upper lip; the posterior angle of both eyes are situated a little farther back than the angle of the mouth, the eyes are separated by a sharp rest, the diameter of which is scarcely $\frac{1}{4}$ of the horizontal diameter of each eye. The tongue and teeth resemble those organs of *S. humilis*. The greatest vertical diameter of the body, at about the middle of the dorsal is $2\frac{1}{3}$ in the total length. On the diameter may be counted about 76 scales. The latter are rough to the touch; on the radical part appear upwards of 16 radiating lines, some of which are divided in two; the centre of the posterior margin is armed with from 9 to 12 fine spines. The lateral line proceeds straight in the middle of the side from the gill-opening to the caudal; it contains upwards of 95 scales, each with a minute central tube. The first dorsal ray commences opposite the anterior angle of the upper eye; the longest rays, towards the middle of the fin slightly exceed $\frac{1}{2}$ of the length of the head. The anal resembles the dorsal. The rounded caudal is distinct, but united by a membrane to the dorsal and anal; its length is $\frac{4}{5}$ of the head. The pectoral is elongated $\frac{3}{5}$ of the length of the head. The ventrals are nearly equal, about $\frac{1}{2}$ of the length of the head.

Left side. Numerous filaments appear on the lower lip and the lower margin of the gill-cover. The left pectoral is but $\frac{2}{3}$ of the right. Single individuals occur at Pinang at all seasons.

SUB GEN. SYNAPTURA,* *Cantor*.(BRACHYURUS, *Swainson*, 1839.)

General structure of *Solea*, but the caudal, dorsal and anal fins are all united.

SYNAPTURA COMMERSONIANA, (Lacépède.)

Pleuronecte commersonien, Lacép. III. Pl. 12, Fig. 2, (not IV. Russell, LXX. Jerree Potoo A. 656.)

Solea commersoniana, Cuvier, R. A. II. 343.(').

Brachirus commersonii, Swainson, II. 303.

Ikan lédah† of the Malays.

Right side. Greenish or brownish olive, darkest on the opercles, minutely dotted with brown; all the scales with a small vertical buff spot behind the cilia, giving a dusty appearance to the ground colour; pectoral black with buff margin; rest of the fins like the body but lighter; dorsal, caudal and anal with a narrow milkwhite edge within which a second sooty brown, composed by a series of single spots on the membranes; lips and pointed papillæ of the lower olive; mouth and opercles inside pale olive, closely dotted with black. Iris a silvery or golden green ring; the rest bluish black.

Left side. Pectoral and ventral buff.

D 78 or 81.

C 12, *Right V* 5, *Left V* 4, P 6, Br. VI.

A 65 or 66,
155 or 159

HABIT: *Sea of Pinang, Malayan Peninsula, Singapore.*
Coromandel.

TOTAL LENGTH: $8\frac{4}{5}$ inch.

Right side. The length of the head is $\frac{1}{7}$ of the total. The upper orbit is situated above the middle of the right upper lip at equal distance from the angle of the mouth and the muzzle; the greatest diameter is oblique, upwards and backwards is $\frac{1}{8}$ of the length of the

* Συναπτός, joined; οὐρά, tail. Substituted for *Brachirus*, properly written: *Brachyurus*, Swainson 1839, preoccupied by *Brachyurus*, Fischer, 1814. (*Mammalia*.)

† Lédah, tongue.

head. From the anterior angle of the upper orbit proceeds a short bony ridge which terminates close to the muzzle in a flat rounded point, which with the muzzle produces a short furrow. The lower orbit is situated immediately above the angle of the mouth, a little posterior to the upper one, and in a different position. The greatest diameter is oblique, downwards and backwards, scarcely shorter than that of the upper orbit. The distance between the anterior angles of both orbits equals their greatest diameter. The posterior aperture of the nostril is a little in front of the lower orbit; the anterior is a little farther in front, tubular or pierced through a small papilla. The lower right lip is fleshy with numerous pointed papillæ. The tongue is minute, linear, smooth. The teeth resemble those of *Solea humilis*. All the scales of the head, below the level of the upper eye are a little larger than those of the body; above that level, towards the origin of the lateral line, they are nearly double the size, and by far the greatest of all. The form of all is nearly rectangular, with the posterior margin rounded, with 8 or 9 fine spines, which make the scales rough to the touch. At the radical part appear 3 or 4 radiating lines. The greatest vertical diameter of the body, at the commencement of the second third of the back, is $\frac{1}{4}$ of the total length. This diameter contains about 71 series of scales. The lateral line commences behind the upper part of the opercle and proceeds straight, a little nearer the back than the abdomen, to the caudal. It consists of about 167 minute central tubes. The first dorsal ray commences close to the muzzle, a little below the level of the anterior margin of the upper orbit. The rays, of which the first four are undivided, gradually increase in length to the last which is $\frac{1}{2}$ of the length of the head. The caudal is elongated, terminating in a rounded point, $\frac{3}{4}$ of the length of the head. The anal, all the rays of which are divided, commences beneath the posterior part of the interopercle, between the two ventrals. The basal half of all three vertical fins are covered with minute scales, and the points of the rays project a little beyond the membrane. They are so closely connected, that the milkwhite outer margin is uninterrupted, and the shape of the fish resembles a broad point of a lance. The length of the pectorals is $\frac{1}{2}$ of the head. The ventrals are situated immediately in front of the anal, but on a little higher level; their length equals the pectorals. On

the left side about the lower lip and the throat appear a number of short white filaments. The figure of Russell (LXX.) is incorrect. The short arch above the upper eye is not produced by the lateral line, but by a bony ridge, and the caudal fin is too short and rounded, and distinct. His original was probably mutilated. Single individuals are of rather rare occurrence at Pinang.

SYNAPTURA ZEBRA, (Bloch.)

Pleuronectes zebra, Bloch, Tab. 187.

Pleuronectes zebra, Linné: Syst. 1226.

Pleuronectes zebra, Shaw, IV. 305, Pl. 44.

Solea zebra, Cuvier, R. A. II. 343 (')

Pleuronectes zebra, Bennett: Life of Raffles, 692.

Brachirus zebra, Swainson, II. 303.

Right side. Ground colour of head, body, dorsal, anal and ventral fins reddish white minutely dotted with brown; on the head and body upwards of 19 vertical sooty- or blackish-brown bands extending over the dorsal and anal; the bands double or in pairs, frequently confluent towards the tail; a reddish yellow or pale orange band over the root of the caudal and the last dorsal and anal rays; rest of the caudal black with several oval milkwhite spots; pectoral black; pupil iridescent, circular; iris pale golden, with four radiating blackish bars.

Left side. Pectoral, ventral and filaments of the mouth and throat reddish white; opercle and abdomen bluish.

D 81 or 83.

C 16, *Right V 5, Left V 4, P 7 or 8, Br. VI.*

A 67 or 65

164

HABIT: *Sea of Malayan, Peninsula and Islands.*

Chusan, Macao, Bay of Bengal, Sumatra.

TOTAL LENGTH: 7 inch.

Right side. The length of the head is $\frac{1}{7}$ of the total. The upper orbit is situated above the middle of the upper right lip, at equal distance from the muzzle and the angle of the mouth; the horizontal diameter is $\frac{1}{8}$ of the length of the head. The lower orbit is a little farther backwards, immediately above and behind the angle of the

mouth: the horizontal diameter equals that of the upper; the distance between both is somewhat less. A slight downwards arched ridge proceeds from the anterior angle of the upper orbit to the muzzle. The nostrils, mouth and teeth resemble those of *S. commersoniana*, but the lower right lip presents no papillæ. The greatest vertical diameter, at the end of the anterior third of the body, is $3\frac{2}{3}$ in the total length; it contains upwards of 71 series of scales. The latter are all small, nearly rectangular, with 7 to 9 radiating lines at the radical part, and with as many spines at the posterior rounded margin. The lateral line in its course resembles that of *S. commersoniana*; it consists of upwards of 121 small central tubes. The dorsal commences opposite the anterior angle of the upper orbit, at a distance from the upper lip of $\frac{1}{3}$ of the length of the head, but not immediately from the upper lip, as represented by Bloch, and the copies of his incorrect figure. The anterior 26 to 28 rays are undivided; the last rays are the longest and as well as the caudal and the last anal rays slightly exceed the length of the head. The caudal is broader and more rounded than in *S. commersoniana*, which in other respects the three united fins resemble. The pectoral is very pointed owing to the second upper ray being much longer than the rest, although it is but $2\frac{1}{2}$ in the length of the head. The length of the ventrals is about $\frac{1}{4}$ of the length of the head; they are placed as in *S. commersoniana*, but the distance from the first anal ray is a little greater. Single individuals occur at Pinang at all seasons.

GEN. ACHIRUS, Lacépède, 1802.

Resembling *Solea*, but destitute of pectoral fins; dorsal and anal distinct from caudal; eyes and colours on the right side.

ACHIRUS PAVONINUS, Lacépède.

Achire pavonine, Lacépède, IV. 660.

Pleuronectes pavoninus, Shaw, IV. 310.

Right side. Ground colour of head, body and fins yellowish- or pink-brown; the fin-membranes dotted with black; scales edged with dark brown; head and body with numerous larger and smaller rounded milkwhite spots, edged and minutely dotted with dark brown, and with a round soot-coloured spot in the centre; a few of the white

spots confluent; base of dorsal and caudal with a series of spots like those of the body; the rest of these fins, the right ventral and the caudal with numerous smaller spots destitute of the brown central spot. Iris annular, golden; rest brownish.

Left side. Head and body brownish white or buff; opercle and abdomen pale bluish; filaments of the head white.

D 67, C $12\frac{3}{5}$, A 50, V 5, P 0, Br. *right* VI; *left* V?

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $7\frac{6}{8}$ inch.

The length of the head is $6\frac{1}{3}$ in the total. The upper orbit is situated at the upper third of the head, at equal distance from the muzzle and the angle of the mouth; the horizontal diameter is $\frac{1}{7}$ of the length of the head. The lower orbit is situated vertically below the upper, at a distance of $1\frac{1}{2}$ diameter immediately above and behind the angle of the mouth; it is a little larger than the upper orbit. Between the anterior angles of both appears like a pore the posterior aperture of the nostril; the anterior one is tubular, pierced through a small tubercle which is situated lower down, immediately above the centre of the upper lip. The jaws are equal; the mouth very little distorted to the left; the lips are fleshy. The right side is toothless, but on the left appear numerous, minute, setaceous teeth, so completely hid by the lips, that during life they easily escape observation. On the left side of the head and on the throat appear numerous small filaments. The tongue is minute, smooth, truncated triangular. The body forms a regular elongated oval; its greatest vertical diameter is a little less than $\frac{1}{3}$ of the total length; this diameter contains about 67 series of scales. The latter are small, oval. On the posterior margin appear some spines so excessively minute, that the surface does not appear rough to the touch. The rest of the circumference of the scales is divided by upwards of 55 backwards radiating lines. The lateral line commences from the upper margin of the opercle; at first it slightly descends, and then continues in the middle of the side to the caudal; it contains about 99 central tubes. The dorsal commences very close to the upper lip, opposite the centre of the distance between the eyes; all the rays are divided; the anterior and posterior ones are a little shorter than the rest, which are about $2\frac{1}{2}$ in the length of the head. The anal resembles the dorsal, but the rays are a little longer. Both

fins have their basal third covered with scales. Immediately above the latter scales, on both sides of the fins, in the centre between each pair of rays, appears a very distinct rounded aperture, the margin of which is a little raised, and the bottom of which is formed by a lamina of the fin membrane. From the upper part of each aperture proceeds a linear fold, which may be traced to the external margin of the fins. Commerson discovered a similar row of pores along the base of the dorsal and anal rays of *Achirus marmoratus*, Lacépède;* and later, Dr. Rüppell observed similar in *Achirus barbatus*, Geoffroy.† The caudal is scaly, rounded, $\frac{3}{4}$ of the length of the head. The right ventral is broad, rounded; all the rays are divided, $\frac{3}{4}$ of the length of the head; the fifth ray is throughout connected by a membrane to the first anal. The left ventral commences a little more backward; it is narrower and shorter, and not joined to the anal. A single individual was observed at Pinang in August 1843.

GEN. *PLAGUSIA*, Brown, 1756.

Dorsal, caudal and anal fins united; otherwise resembling *Achirus*.

Eyes and colour on the left side.

PLAGUSIA BILINEATA, (Bloch.)

Pleuronectes bilineatus, Bloch, Pl. 188.

Pleuronectes bilineatus, Linné: Syst. 1235.

Russell, LXXIV. Jerree Potoo E.

Pleuronectes bilineatus, Shaw, IV. 317.

Plagusia bilineata, Cuv. R. A. Ed., 224.⁽³⁾.

Plagusia bilineata, Rüppell, Atlas, 123.

Plagusia dipterygia, Rüppell, ibid. 123, Taf. 31, Fig. 3, (*Young*.)

Pleuronectes bilineatus, Bennett: Life of Raffles, 692.

Plagusia bilineata, Rüppell: Neue Wirb. Fische, 84.

Plagusia dipterygia, Rüppell, ibid.

Plagusia bilineata, Swainson, II. 303.

Plagusia bilineata, Bleeker: Verh. Batav. Gen. XXII. 5.

Ikan lédah of the Malays.

* Lacépède, IV. 660.—*Pleuronectes marmoratus*, Shaw, IV. 310.

† Ann. du Mus, I, Pl. XI.—Rüppell: Atlas, 122, Tab. 31, Fig. 2.

Left side. Pale reddish brown; scales with metallic iridescent reflections, with a pale dark brown longitudinal line, and with a buff or whitish vertical line along the root of the fine spines; opercle bluish or neutral tint; fin-membranes hyaline; rays buff. Iris narrow golden round the circular pupil; rest blackish blue.

Right side. Brownish white; opercle and abdominal cavity bluish.

D 96 or 97,

C 8, *left* V 5, *right* V 4, P 0, Br. VI.

A 70 or 73,

$\overline{174}$ or $\overline{178}$

HABIT.—*Sea of Malayan Peninsula and Islands.*

Coromandel, Bay of Bengal, Red Sea, Sumatra, Java, Madura.

TOTAL LENGTH: 9 inch.

Left side. The form of this as of all the following species is elongated lanceolate. The length of the head is $4\frac{1}{2}$ in the total. The muzzle bluntly pointed; the distance to the anterior angle of the upper orbit is $10\frac{1}{2}$ in the total length; the muzzle terminates downwards in a remarkably long sickle-shaped process, which extends below the lower jaw to opposite the angle of the mouth, or in young individuals a little beyond it.* The distance from the muzzle to the point of the sickle-shaped process, its length, varies individually from $5\frac{1}{2}$ to $6\frac{1}{2}$ in the total length; in young individuals it is proportionally longer, slightly exceeding $\frac{1}{5}$. The upper orbit is situated in the centre of the head, above the middle of the upper lip; the horizontal diameter is $\frac{1}{13}$ of the length of the head. The lower orbit is thrown farther back above the angle of the mouth; both are of about equal size, and their vertical distance but slightly exceeds the horizontal diameter. The left side of the jaw is toothless with fleshy papillular lips; in the right of both appear crowded fine setaceous teeth. A single nostril appears in front of the lower eye, close to the lip: the tongue is minute, rounded, smooth. The greatest vertical diameter of the body, at the commencement of the anal fin, equals the length of the

* The young are farther distinguished by their excessively minute right ventral fin. The description and plate of *Plagusia dipterygia*, Rüppell, offer no specific distinguishing character.

head ; on it appear about 44 series of scales. The latter are elongated oval ; those of the body double the size of those of the head. The anterior margin carries upwards of 17 minute spines, rough to the touch ; the radical part upwards of 60 radiating lines. A line between the gill-opening and the caudal contains about 85 scales. The lateral line commences at the muzzle, ascends a little above the upper orbit ; from thence it is straight to near the upper margin of the opercle, where it makes a very short ascent, and then continues straight, nearly in the middle of the body to the caudal. Above the preopercle it gives off a short vertical branch, which again is divided in three principal branches : an upper which proceeds backwards to the margin of the opercle, a second obliquely downwards over the opercle, and a third, which following the anterior arch of the preopercle despatches a branch backwards to the lower part of the opercle, and terminates on the throat. Above the opercle the lateral line gives off another short branch which rises vertically, and divides in what is called the second lateral line of which the anterior branch proceeds near the base of the dorsal towards the muzzle, the posterior continues near the dorsal to the caudal. The dorsal commences far in front of the eyes at a short distance from the muzzle. The dorsal, caudal and anal rays are undivided, and nearly of equal length, $\frac{1}{3}$ of the head, with the points slightly projecting beyond their membranes. The left ventral is situated at the gill-opening, on a level a little above the anal ; the first ray is very short and closely connected to the second ; the rest gradually increase in length ; the fifth is the longest, $\frac{1}{5}$ of the head and by a membrane throughout connected to the first anal. The stomach is capacious, broad pyriform ; the intestinal canal simple, forming two circumvolutions ; its length is less than $\frac{2}{3}$ of the total. Single individuals occur at Pinang at all seasons. They are of excellent flavour.

PLAGUSIA CYNOGLOSSA,* (Buchan. Ham.) VAR. A.

Ikan lédah of the Malays.

Left side. Ground-colour pale reddish brown, posterior half of head

* SYN. *Achirus cynoglossus*, Buchan. Hamilton, 132, 373. Marked *Achirus kukurjibha* in Buchanan's duplicate series of drawings.

Hab. Bay of Bengal, mouths of the Ganges.

and the body largely spotted and marbled with blackish brown; dorsal, caudal and anal rays brownish, their membranes pale brownish transparent, minutely dotted with black; ventrals whitish. Iris golden, annular, rest bluish black.

Right side. Brownish white; opercle and abdominal cavity pale bluish.

VAR. B

Left side. Differs from *Var. A* by having 7 or 8 vertical, blackish brown, distant bands not extending over the dorsal and anal; head and intervals with irregular blackish brown spots.

D 100 or 102,

C 10, V 4, P 0, Br. VI.

A 76 or 78,

186 or 190.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 6 inch.

Left side. The length of the head is $5\frac{2}{3}$ in the total. The distance from the very bluntly pointed muzzle to the upper eye is $\frac{1}{18}$ of the total length; the point proceeding downwards from the muzzle barely covers the symphysis of the lower jaw; its length equals the distance from the muzzle to the upper eye. Both eyes are excessively minute, like points. The upper one is situated at the anterior third of the head, opposite the middle of the upper lip. The lower is a little farther back, immediately above the posterior third of the upper lip. The distance between both is apparently two diameters. No nostril is distinguishable. The left side of the lips is not papillular; the right completely hides the minute teeth. The greatest vertical diameter of the body, in front of the anal, is $4\frac{2}{3}$ in the total length; on it appear 31 to 33 series of scales. The latter are on the body comparatively large, elongated oblong, with about 17 minute spines at the posterior margin, and about 36 radiating lines on the radical portion. There are about 81 on a straight line between the gill-opening and the caudal. The lateral line with its ramifications, resembles that of *P. bilineata*. The length of the pointed caudal is $\frac{1}{2}$ of the head. The distance from the first anal to the first ventral ray equals that between the muzzle and the upper eye, which is nearly thrice that of these fins in *P. bili-*

neata. In other respects the fins resemble those of the latter species. At Pinang single individuals occur, but rarely, which in addition to their small size, makes them less valued as an article of food.

PLAGUSIA TRULLA, Cantor.

Ikan lédah of the Malays.

Left side. Pale dark reddish brown; opercles much darker than the rest; in some individuals a series of short, distant, vertical bluish lines under the anterior half of the dorsal, and above the anterior third of the anal; scales with a dark longitudinal line; posterior margin buff; fins transparent pale brownish, minutely but faintly dotted with black. Iris annular golden; rest bluish black.

Right side. Brownish white, opercles and abdominal cavity blackish blue.

D 109 or 111,

C 12, *left* V 4, *right* 0; P 0, Br. VI.

A 80 or 86,

201 or 209

HABIT.—*Sea of Pinang, Malayan Peninsula.*

TOTAL LENGTH: 1 ft.

Left side. The length of the head is $5\frac{1}{4}$ in the total. The distance from the rounded muzzle to the anterior angle of the upper orbit is from $13\frac{1}{2}$ to $\frac{1}{14}$ of the total length. The point proceeding downwards from the muzzle covers the symphysis of the lower jaw; its length equals the distance between the muzzle and upper orbit. The latter is situated a little behind the anterior third of the length of the head, opposite the middle of the upper lip. The horizontal diameter is $10\frac{1}{2}$ in the head. The lower orbit is placed a little farther back, still considerably in front of the angle of the mouth; it is a little smaller than the upper; the vertical distance between both slightly exceeds the horizontal diameter of the upper. Immediately beneath the latter appears a small, but remarkably developed bony protuberance, or spine. A single aperture of the nostril appears a little in front of the lower eye above the lip. The lips are fleshy, but not papillular, otherwise the mouth, tongue and dentition resemble *P. bilineata*. The greatest vertical diameter of the body, towards the middle, is $4\frac{1}{2}$ to $4\frac{2}{3}$ in the

total length. It contains 45 series of scales. For the size of the fish the latter are rather small, elongated oval, with about 21 radiating lines at the radical part, and 13 spines at the posterior margin, which is rough to the touch. A straight line between the opercle and the caudal contains about 117. The lateral line and its ramifications resemble *P. bilineata*. The distance between the muzzle and the first dorsal ray, and that between the first ventral and anal ray equal $\frac{1}{2}$ of that between the muzzle and upper eye. The length of the caudal varies from $2\frac{1}{2}$ to $\frac{1}{2}$ of the length of the head. There is but a single ventral, on the left side, connected by a membrane to the anal. But for the absence of the ventral fin, the figure marked *Plagusia abbreviata* in *Illustrations of Indian Zoology*, II. Pl. 94, Fig. 3, might be supposed to represent the present species. Individuals, although never in great numbers, occur at all seasons at Pinang, and are highly valued for their flavour.

PLAGUSIA GRANDISQUAMIS, Cantor.

Left side. Pale reddish brown; scales with metallic iridescent reflections, a central dark longitudinal line, and the posterior margin buff; opercle and abdominal cavity bluish black; from above the opercle closely beneath the base of the dorsal a black band, gradually narrowing towards the caudal; from a little behind the abdominal cavity immediately above the base of the anal a similar black band joining the former at the root of the caudal; dorsal and anal pale brownish transparent, minutely dotted with black; caudal black, ventrals white. Iris annular golden, rest minutely dotted with black.

Right side. Brownish white; opercle and abdominal cavity bluish black.

D 116,

C 10, V 4, P 0, Br. VI.

A 88,

214

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $7\frac{2}{8}$ inch.

Left side. The general form is narrow, elongated lanceolate, resembling *Plagusia lingua*, (Buchanan Hamilton.)

The length of the head is $5\frac{1}{3}$ in the total. The distance from the oval muzzle to the anterior angle of the upper orbit is $\frac{1}{14}$ of the total length; the point proceeding downwards from the muzzle is broad, barely covering the symphysis of the lower jaw; its length equals the distance between the muzzle and the upper orbit. Both orbits are nearly equal; the upper one is situated at the second fifth of the head opposite the middle of the upper lip; the horizontal diameter is $\frac{1}{10}$ of the length of the head. The lower orbit is placed very little farther back than the upper. The interval between both is excessively narrow, a short linear septum; between the anterior angles of both appears a small pointed, triangular, bony protuberance. The nostril has a single aperture in front of the lower eye, above the upper lip. The lips are fleshy, not papillular; the excessively minute teeth on the right side are completely hid from view. The tongue is linear, smooth. The greatest vertical diameter, at the anterior third of the body, equals the length of the head. On it appear 17 series of remarkably large scales, of a broad oval form. The length of the largest is $\frac{1}{5}$ of the head, their breadth $\frac{1}{10}$; at the radical part appear upwards of 50 radiating lines; at the posterior margin 36 to 38 fine spines, rough to the touch. A straight line between the opercle and caudal contains 59 scales. The lateral line and its ramifications resemble those of *P. bilineata*. The dorsal commences at a distance from the muzzle of $\frac{1}{2}$ of that from the latter to the upper eye; the longest rays, as well as the pointed caudal, is $\frac{1}{3}$ of the head. The distance between the left ventral and the anal is $\frac{1}{2}$ of that between the muzzle and the upper eye. Both ventrals are nearly equal, $\frac{1}{3}$ of the head; the last ray of the left ventral is throughout united to the first anal. In other respects the fins resemble those of *P. bilineata*. A single individual occurred at Pinang in December 1842. The scales were deciduous, probably from decay. The fishermen were not acquainted with the species.

PLAGUSIA LINGVA, (Buchanan Hamilton.)

Cynoglossus lingva, Buchan. Ham. 32, 365.*

‘Ikan lédah’ of the Malays.

Left side. Reddish brown; the scales with golden iridescent reflections, a dark longitudinal central line, and the posterior margin buff;

* Marked *Acheiris jibha* in Buchanan’s duplicate series of drawings.

opercle blackish blue ; sides with distant rounded and irregular blackish brown spots ; dorsal and anal pale brownish grey, transparent, minutely dotted with black ; the dorsal immediately in front of the caudal, and the latter itself, black ; ventrals white. Iris golden, annular ; rest blackish blue.

Right side. Brownish white ; abdominal cavity blackish blue.

D 137.

C 10, V 4, P 0, Br. VI.

A 107.

254.

HABIT : *Sea of Pinang.*

Bay of Bengal, Gangetic estuaries.

TOTAL LENGTH : 1 ft.

Left side. The length of the head is $5\frac{1}{3}$ in the total. The distance from the oval muzzle to the anterior angle of the upper orbit is $11\frac{1}{3}$ in the total length ; the point proceeding downwards from the muzzle projects a little beyond the symphysis of the lower jaw ; its length equals the distance between the muzzle and the upper orbit. The latter is situated in the centre of the length of the head, opposite the middle of the upper lip ; the horizontal diameter is $\frac{1}{11}$ of the length of the head. The lower orbit is placed farther back a little in front of the angle of the mouth ; it is slightly smaller than the upper one. The vertical distance between the two equals the diameter of the upper. Between both appears a very distinct oval aperture, according to Buchanan Hamilton the posterior aperture of the nostril, which has another above the upper lip in front of the lower eye. The mouth, tongue, and dentition agree with *P. grandisquamis*. The greatest vertical diameter, at the anterior third of the body is $6\frac{2}{3}$ in the total length. On it appear 31 series of elongated, irregularly oval scales with upwards of 37 radiating lines at the radical part. Those of the anterior part of the body have the centre of the posterior margin very finely ciliated, not rough to the touch ; in the rest of the scales this margin is smooth and bluntly pointed. A straight line between the opercle and caudal contains about 100 scales. The lateral line and its ramifications resemble those of *P. bilineata*. The dorsal commences very close to the point of the muzzle, $\frac{1}{3}$ of the distance from the latter to the upper orbit ; the rays slowly increase towards the caudal, the

longest being $\frac{1}{3}$ of the head. The caudal terminates in a very sharp point; its length is $\frac{1}{2}$ of the head. The distance between the first, left, ventral and the anal ray is scarcely $\frac{1}{3}$ of that between the point of the muzzle and the upper orbit. The right ventral is smaller and so near the left, which is closely connected with the anal, that Buchanan Hamilton overlooked both. In other respects the fins resemble those of *P. bilineata*. Single individuals occur, but rarely, at Pinang.

PLAGUSIA POTOUS, Cuvier.

Russell, LXXIII. Jerree Potoo D.

Plagusia potous, Cuvier, R. A. II. 344 (').

Ikan lédah of the Malays.

Left side. Lighter or darker copper-red; the scales with strong metallic iridescent reflections; opercle and abdominal cavity pale blackish blue; fins transparent pale brownish, minutely dotted with brown; caudal blackish; ventrals whitish. Iris annular, pale golden; rest blackish blue; superior margin of the upper orbit and lower of the inferior with a buff crescent-shaped membrane.

Right side. Brownish white; opercle and abdominal cavity pale bluish.

D 126 or 127.

C 10, V 4, P 0, Br. VI.

A 94 or 95.

230 or 232.

HABIT: *Sea of Malayan Peninsula and Islands.*

Coromandel.

TOTAL LENGTH: 1 ft. 2 inch.

Left side. The length of the head is $5\frac{1}{4}$ in the total. The distance from the centre of the oval muzzle to the anterior angle of the upper orbit is from $11\frac{1}{3}$ to $\frac{1}{12}$ of the total length. The point proceeding downwards from the muzzle covers the symphysis of the lower jaw, or is a little shorter; its length equals the distance between the muzzle and the upper orbit. The latter is situated a little in front of the centre of the length of the head, opposite the middle of the upper lip; the horizontal diameter is $\frac{1}{11}$ of the length of the head. The lower orbit, in size equals the upper; it is placed little farther back, considerably in front of the angle of the mouth. The vertical distance between

both equals the horizontal diameter. In front of the lower orbit, above the lip, appear two small apertures of the nostril, separated by a narrow membranous septum; the lower is oval, double the size of the circular upper one, which opens under a small bony protuberance. The mouth, tongue, and teeth resemble those of *P. grandisquamis*. The greatest vertical diameter of the body, at the anterior third, is $5\frac{1}{2}$ in the total length. On it appear 23 series of oval scales, of which the largest are $\frac{1}{7}$ of the length of the head; their breadth $\frac{1}{14}$. The radical part is marked with upwards of 46 radiating lines; the posterior margin with 36 to 38 very minute spines, barely perceptible to the touch. A straight line between the opercle and the caudal contains 69 scales. The lateral line and its ramifications resemble those of *P. bilineata*. The fins resemble those of *P. lingua*. The description of Russell gives 148 dorsal rays, which probably is a misprint instead of 128. At all events there is a great discrepancy between the description and the plate which represents 165 dorsal and 155 anal rays. The form of all the fins is incorrect. At Pinang this species occurs, although never in great numbers, at all seasons. It is of excellent flavour, and, like *Plagusia trulla*, passes at European tables under the denomination of "Sole."

With the exception of *Plagusia grandisquamis*, which was not observed alive, the other species are all distinguished for their tenacity of life. The fishermen at Pinang assert that some species of *Plagusia* shoal at certain seasons.

ORDO PHARYNGOGNATHI.

SUBORDO PHARYNGOGNATHI ACANTHOPTERYGII.

FAM. SCAROIDÆ.

GEN. JULIS, Cuvier, 1817.

Head smooth, without scales; lateral line forming an elbow opposite the end of the dorsal fin.

JULIS DUSSUMIERI, Cuv. and Val.

Julis dussumieri, Cuv. and Val. XIII. 478, Pl. 387.

Ground-colour of the head and body light green; abdomen greenish

white; on the upper part of the head some vermilion spots; a broad vermilion band edged with deep blue from the eye to the angle of the mouth; a second obliquely over the cheek towards the angle of the mouth; a third on the preopercle; a fourth on the temple round the eye; a fifth along the upper margin of the opercle; a sixth, angular, on the upper half of the opercle; on the lower half a large vermilion spot; a seventh on the subopercle; each of the scales of the back and sides with a large central vermilion spot; in front of the vermilion root of the pectorals a large dark-blue spot; pectorals hyaline, the rest of the fins pale yellowish green; dorsal with a series of oblique vermilion lines along the base; a central brownish-lilac undulating line between the five first spines; between the fifth and sixth a large dark-blue spot; between the succeeding spines and rays a large triangular brownish lilac spot occupying the upper half of the membrane; upper margin vermilion; angles of the caudal with a triangular orange spot with a basal vermilion line; two indistinct vertical brownish bands in the middle, the whole fin with numerous small blue spots; anal with a series of oblique vermilion lines along the base; upper half brownish lilac, the three spines with vermilion points; first and second ventral rays vermilion. Iris narrow golden, next vermilion, orbital margin brownish green with a vermilion spot at the lower half.

D 9/12, C $14\frac{6}{4}$, A $3\frac{1}{12}$, V $1\frac{1}{5}$, P 16, Br. V.

HABIT.—*Sea of Pinang.*

Malabar.

TOTAL LENGTH: $6\frac{2}{8}$ inch.

The length of the head is $4\frac{1}{2}$ in the total. The eye occupies the third-fifth of the head, and the upper third of the vertical diameter passes through it; the horizontal diameter is $\frac{1}{5}$ of the length of the head. The greatest vertical diameter of the body equals the length of the head. The tooth on each side of the symphysis of the upper jaw is longer than the succeeding seven of the external series, which gradually decrease in length. At the angle of the mouth at some distance from the last tooth appears a strong obliquely downwards and forwards pointed tooth. Two teeth on each side of the symphysis of the lower jaw are longer than the rest, which are smaller than the corresponding ones of the upper jaw. The scales of the body are large, striated. A longitudinal series contains 26, an oblique 11. The lateral line consists

of tubes, each with a smaller superior and an inferior tube branching off backwards. The anterior part of the line rises obliquely towards the sixth dorsal spine, the rest proceeds straight along the upper fourth of the body towards the ninth ray, when it declines a little and proceeds straight towards the caudal. The posterior margin of the latter fin is rounded. The last ray of the dorsal and the anal, and the first ray of the ventrals are elongated into a very short filament. The anterior anal spine is very minute. The figure of M. M. Cuvier and Valenciennes does not quite correspond to their very correct description. A single individual occurred at Pinang in June 1844.

JULIS MOLA, Cuvier.

Russell, CXX. Sahnee Moia.

Julis mola, Cuvier, R. A. II. 258.

Sahnee moia, Cuv. and Val. XIV. 234.

Ground-colour of the head and body pale sea-green; abdomen whitish green; from the muzzle over the forehead along the base of the dorsal a dark brown longitudinal band; a second from the side of the muzzle through the eye along the middle of the side to the root of the caudals; the two bands in some consisting of two or three series of spots; on the upper part and sides of the head some irregular orange streaks; pectorals hyaline, red at the root; ventrals white; rest of the fins pale yellowish green; dorsal with an undulating pale blackish band along the base and a second along the middle; in some a black spot either between the fifth and seventh spine, or between the first and second; caudal with some pale bluish spots, and in some with a black spot at the root; anal with pale blackish spots near the margin. Iris narrow golden, next vermilion; orbital margin dark brown.

D 9/12, C $14\frac{5}{3}$, A 2/12, V 1/5, P 15, Br. V.

HABIT.—*Sea of Pinang.*

Coromandel.

TOTAL LENGTH: $4\frac{6}{8}$ inch.

The length of the head is $3\frac{3}{4}$ in the total. The diameter of the eye, situated as in *J. dussumieri*, is $\frac{1}{5}$ of the length of the head. The dentition and scales resemble those of the latter species. A longi-

tudinal series contains 27, an oblique 13 scales. The lateral line proceeds straight along the upper fourth of the body towards the ninth dorsal ray, from whence it declines towards the middle of the side and proceeds straight towards the caudal. The line is composed of tubes, from each of which, anterior to the ninth dorsal ray, branch off backwards a superior and inferior smaller tube. The greatest vertical diameter of the body equals the length of the head. The first seven dorsal spines are shorter than the rest, which makes the anterior part of the fin lower than the posterior. The stomach is a short elongated tube, slightly more voluminous than the intestinal canal which is thrice doubled upon itself. The length of both is $\frac{1}{3}$ of the total. The air-vessel is small, elongated conical, of a silvery colour. Single individuals occur, but rarely, at Pinang.

GEN. SCARUS, Gronov. 1763.

Jaws (intermaxillary and premandibular bones) convex, rounded, with teeth, arranged like scales, on their edge and anterior surface; lips single, fleshy; body oblong with large scales; lateral line interrupted; one inferior and two superior pharyngeal plates with teeth like transverse laminæ.

SCARUS PSITTACUS, Forskål.

Scarus psittacus, Forskål, 29.

Scarus psittacus, Shaw, IV. 397.

Scarus psittacus, Cuv. R. A. II. 266 (1).

Scarus psittacus, Rüppell: Atlas, 77, Tab. 20, Fig. 1.

Scarus psittacus, Rüppell: Neue Wirbelth. Fische, 28.

Scarus psittacus, Cuv. and Val. XIV. 226.

Petronason psittacus, Swainson, II. 226.

Young. Head above and ground-colour of the back and sides greenish light-blue; all the scales of the latter parts with broad orange margins, forming a net-work; cheeks, opercles, throat and abdomen reddish white; upper lip surrounded by a light blue streak; a second similar from the angle of the mouth obliquely upwards surrounding the lower half of the orbit; a third from the chin to the cheek; a fourth at the anterior margin of the preopercle obliquely backwards over the opercle; a fifth along the posterior margin of the preopercle;

from the orbit radiate two upwards and two backwards; in front of the pectoral at the margin of the gill-opening an irregular, light blue spot; dorsal reddish orange; rays, upper and basal margin light blue; caudal membrane yellowish brown, base, upper, lower and posterior margin as well as the rays light blue; anal reddish orange, base and lower margin light blue; spine and point of the ventrals light blue; anterior half of the membrane orange, posterior half white; pectorals yellowish white, second ray light blue. Iris narrow golden round the pupil; rest greenish olive.

D 9/10, C $13\frac{3}{3}$, A 3/9, V 1/5, P 15, Br. V.

HABIT.—*Sea of Pinang.*

Red Sea.

TOTAL LENGTH: $10\frac{4}{8}$ inch.

The length of the head is $3\frac{3}{4}$ in the total. The horizontal diameter of the orbit is $4\frac{1}{2}$ in the length of the head. The vertical diameter at the occiput equals the length of the head; the greatest vertical diameter of the body slightly exceeds the length of the head. The body is covered by eight longitudinal series, each containing 23 scales. The lateral line consists of backwards branching tubes. The line continues on the third longitudinal series to the termination of the dorsal fin; a single tube then appears on the succeeding scale of the fourth series; the completing part of the line occupies the five posterior scales of the fifth longitudinal series. This species greatly resembles *Scarus harid*, Forskål, from which it differs in having the outline of the abdomen much more convex than that of the back, and in having the angles of the caudal much less elongated. The first of the undivided anal rays is very short and so closely adhering to the second, that it easily may escape observation. A single individual occurred at Pinang in May 1844.

FAM. GLYPHIDODONTIDÆ.

GEN. TETRADRACHMUM,* *Cantor.*

(Equivalent to *DASCYLLUS*, *Cuvier.*)

Shape oblong; head obtuse; teeth velvety, the external series

* Τετραδραχμων, a coin, worth four drachms. Substituted for *Dascyllus*, Cuvier, 1829, pre-occupied by *Dascillus* (scrib. *Dascylus*.) Latreille, 1796, (*Co-leoptera*).

stronger than the rest, conical, pointed; preopercle toothed, lateral line terminating opposite the soft part of the dorsal fin; branchiostegous rays five.

TETRADRACHMUM ARCUATUM, (Linné.)

Chætodon arcuatus, Linné : Mus. Ad. Fr. I. Pl. 33, Fig. 5.

Chætodon arcuanus, Linné : *ibid.* Fig. 8.

Chætodon abudafur, Forskål, 65, No. 93.

Chætodon arcuatus, Linné : Syst. 1243.

Chætodon arcuanus, Linné : *ibid.* 1250.

Chætodon aruanus, Bloch, Tab. 198, Fig. 2.

Lutjan aruane, Lacépède, IV. 720.

Chætodon arcuatus, Shaw, IV. 341.

Chætodon aruanus, Shaw, IV. 348.

Dascyllus aruanus, Cuv. R. A. II. 179⁽⁶⁾.

Pomacentrus aruanus, Rüppell : Atlas, 39.

Dascyllus aruanus, Bennett : Life of Raffles, 688.

Chætodon araneus, Bennett : Ceylon, No. 17.

Dascyllus aruanus, Rüppell : Neue Wirbelth. Fische, 129.

Dascyllus aruanus, Cuv. and Val. V. 434.

Dascyllus aruanus, S. Müller and Schl. Verh. 21.

Dascyllus aruanus, Bleeker : Verh. Batav. Gen. XXI. 1 Ged. 2, 5.

Alternately black and white; the anterior band black, occupying the space from the throat to the third dorsal spine, excepting the forehead, from between the eyes to the lips, which is white; next a second oblique whitish band bordering upon the root of the ventrals and the pectorals, and continuing along the sixth dorsal spine; next a black band, comprising the ventral fins to a little in front of the anus, over the sides, and over the seventh, eighth and ninth dorsal spine; next a whitish band from the second anal ray, not comprising the spiny portion which is black, over the body along the first dorsal ray; next a nearly vertical black, comprising the rest of the anal rays, the anterior half of the narrow part of the body in front of the caudal, and the rest of the dorsal rays; the rest of the space in front of the caudal is whitish, the anterior half of the latter fin is black, the rest paler or grey; pectorals bluish- or greyish-white. Iris narrow silvery round the pupil, the rest bluish black.

D 12/12, C $15\frac{4}{5}$, A 2/12, V $1\frac{1}{5}$, P 16, Br. V.

HABIT.—*Sea of Pinang.*

South Sea, Timor, Amboina, Indian Ocean, Bay of Bengal,

TOTAL LENGTH : $2\frac{4}{8}$ inch.

Red Sea.

Three individuals were observed at Pinang from 1842 to 1845.

Gen. GLYPHIDODON, (*Forskål.*) *Lacépède*, 1802.

Body compressed oval, and as well as the head covered with large scales ; profile rounded ; mouth small ; teeth in the jaws in a single series, close, equal, narrow, trenchant and frequently notched ; preopercle not toothed ; lateral line terminating opposite the last dorsal ray.

GLYPHIDODON RAHTI, Cuv. and Val.

Russell, LXXXVI. Rahti Pota.

Glyphisodon saxatilis, Rüppell : Atlas, Fische, 35 ?

Chætodon tyrwhitti, Bennett : Ceylon, No. 25 ?

Glyphisodon rahti, Cuv. and Val. V. 456 ; IX. 507.

Glyphisodon rahti, Rüppell : N. W. Fische, 126.

Glyphisodon rahti, S. Müller and Schlegel : Verh. over de nat.
Gesch. 22.

Glyphisodon tyrwhitti ? }
Glyphisodon rahti ? } Richardson : Rep. 1845, 253.

Glyphisodon cælestinus, Cantor : Catal. Mal. Mamm. in Journ. As.
Soc. XV. [*Delphinus plumbeus*.]

Glyphisodon rahti, Bleeker : Verh. Bat. Gen. XXI. 1 Ged. pp.
2, 3, 5.

Upper part of the head and the back as far as the dorsal fin greenish or bluish-black, rest of the back and upper half of the sides greenish yellow or gamboge, lower half of the sides, abdomen, cheeks and opercles bluish silvery, all the scales with blackish margins. In front of the dorsal a vertical black band ; a second from between the sixth and seventh dorsal spine ; a third from the posterior spines ; a fourth from the soft dorsal fin ; a fifth in front of the caudal ; scales between the dorsal spines and rays yellow or greenish, membrane blackish-blue with a broad black margin ; the scaly base of caudal yellow, the rest greenish or bluish-black with a broad black posterior margin ; in some a broad vertical black band behind the base, and the upper and

lower margin black ; the scaly base of the anal bluish silvery, the rest bluish black or grey ; pectorals transparent bluish white, with a black spot at the upper part of the root. Iris golden near the pupil, the rest blue or black.

D 13/13 or 12, C $15\frac{2}{3}$, A $2\frac{1}{12}$, V $1\frac{1}{5}$, P 18 or 19, Br. VI.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singapore.*

New Guinea, Celebes, Java, Ceylon, Bay of Bengal, Bombay, Red Sea.

TOTAL LENGTH : 6 inch.

Not only are the ground colours liable to individual variations according to the yellow or bluish being the prevailing, but the vertical bands are broader or narrower, and the three middle ones are in some continued over the dorsal fin. In some the black bands are very indistinct or almost obliterated, as in the one figured by Russell, No. LXXXVI. in others a few distant black spots appear on the opercles and between the bands (*Chaetodon tyrwhitti*, Bennett) ; the black spot of the pectorals is absent in some, in others it is a continued line along the root of the fin. All ages are subject to these variations. Young individuals are numerous at Pinang at all seasons, but adult ones are seldom seen. They are eaten by the natives.

SUBORDO PHARYNGOGNATHI MALACOPTERYGII.

FAM. SCOMBERESOCIDÆ.

GEN. BELONE, *Cuvier*, 1817.

Jaws forming an elongated beak, the upper part principally composed of the intermaxillaries, the base of the maxillaries ; teeth in both jaws, those of the internal margin longer and more distant than the rest ; those of the external margin small, pointed and closely set ; lips none ; under the symphysis of the lower jaw a short, soft, fleshy appendage ; with one exception, no teeth on the vomer ; pharyngeal teeth small conical ; body elongated with small scales ; bones of the skeleton green.

BELONE ANNULATA, Cuv. and Val.

Russell, CLXXV. Wahlah Kuddera.

Belone annulata, Cuv. and Val. XVIII. 447, Pl. 550.

Toda of the Malays.

Adult. Head above and back sea-green with steel-blue reflections, minutely dotted with black; lighter, silvery on the upper half of the sides; lower half and abdomen silvery white; cheeks and opercles silvery; side of the upper mandible blackish olive, of the lower silvery, with a black line from the angle of the mouth along the base of the teeth; dorsal, caudal and pectoral membranes pale greenish grey, minutely dotted with black, particularly towards the margins; anal and ventrals white, their anterior part minutely dotted with black. Iris silvery, orbital margin black.

Young. Head and back olive green; above the lateral line a narrow greenish silvery longitudinal band; opercles with a large black spot; lower mandible black; posterior two-thirds of dorsal black; on the middle of the caudal a large black spot.

D 22 or 23, C $15\frac{5}{8}$, A 21 or 22, V 6, P 13 or 14, Br. XV.

(*Young* : XIII ?)

HABIT.—*Sea of Pinang, Malayan Peninsula.*

Seychelles, Tongatabu, Celebes, Pondicherry, Vizagapatam.

TOTAL LENGTH : 2 ft. 6 inch.

The young differs from the adult not only in colours, but in relative dimensions. In an individual, $6\frac{2}{3}$ inches in length, the head is $3\frac{1}{3}$ in the total. The vertical diameter at occiput is $\frac{1}{6}$ of the length of the head. The horizontal diameter of the eye is $7\frac{1}{2}$ in the head, measured from the symphysis of the lower mandible, and $2\frac{3}{4}$ in the distance from the anterior margin of the orbit. The distance across the forehead is a little less than the diameter of the orbit. The posterior rays of the dorsal fin exceed by about $\frac{1}{3}$ the length of the anterior ones. The abdominal crest is barely distinguishable. The tongue is fleshy, naked. In another, 11 inches in length, the head is a little more than $3\frac{1}{3}$ in the total; the vertical diameter at occiput is $5\frac{1}{2}$ in the head; the horizontal diameter of the eye is $8\frac{1}{4}$ in the head, measured from the symphysis of the lower mandible, and $\frac{1}{3}$ of the distance from the anterior margin of the orbit; the distance across the forehead slightly exceeds the diameter of the orbit; the posterior dorsal rays exceed by $\frac{1}{8}$ the ante-

rior ones; the abdominal crest is distinct, particularly on the posterior fifth of the body; the margin of the tongue is studded with two or three series of minute polygonal bony plates, placed beside each other like mosaick; the black spots of the opercles and caudal are no longer visible. In an individual, 2 ft. 3 inches in length, the length of the head is $3\frac{1}{2}$ in the total; the vertical diameter at occiput is $\frac{1}{3}$ of the head; the horizontal diameter of the eye is $\frac{1}{9}$ of the length of the head from the symphysis of the lower mandible, and $3\frac{1}{2}$ in the distance measured from the anterior margin of the orbit; the distance across the forehead exceeds by $\frac{1}{3}$ the diameter; the posterior dorsal rays, although somewhat elongated, are but $\frac{1}{2}$ the length of the second ray.* Immediately in front of the caudal the abdominal crest is very sharp, but becomes less so at its termination on the anterior third of the caudal. The hyoid bone and the tongue are entirely covered with a mosaick of small polygonal rough bony plates. The internal surface of the lower mandible presents a structure, which if present in other species, has not been described. The middle where the two branches join each other, is raised and forms a bony ridge, commencing behind the symphysis and gradually widening towards its termination in front of the apex of the tongue. The upper surface of this ridge is flattened, but made uneven by numerous transversal sharp bars, or rather by one continued closely waved bar, forming a kind of grate. The ridge is separated from the teeth by a deep groove, intervening on each side, and is covered by the fine membrane lining the rest of the cavity. In the young it differs by having a comparatively smaller number of transversal bars. The corresponding surface of the upper mandible is smooth, with a longitudinal fissure. In the adult fish the two anterior branchiostegous rays are so very minute, that they may easily escape observation; in young ones they appear to be absent. At Pinang this species is numerous at all seasons, but large individuals are scarce. In several examined, both of the present and the following species, the stomach contained nothing but thick mucus. The fish is eaten by the natives, although it is very insipid.

* The figure of Russell is in this respect correct; but the last dorsal ray is placed too near the caudal. The distance between the two fins exceeds by $\frac{1}{3}$ the length of the last dorsal ray.

BELONE CAUDIMACULA, Cuvier.

Russell, CLXXVI. Kuddera, A.

Belone caudimacula, Cuv. R. A. II. 285 (?).

Belone caudimacula, Cuv. and Val. XVIII. 452.

Belone caudimacula, Bleeker : Verh. Bat. Gen. XXII. 5.

Toda of the Malays.

Head above and back yellowish green minutely dotted with brown ; lighter, silvery on the sides ; posterior half of the latter with a deep-blue longitudinal band, bordered beneath by a broader shining silvery one ; abdomen white ; sides of mandibles, cheeks and opercles silvery ; dorsal, and in some the anal bright yellow, minutely dotted with brown along the rays ; caudal yellow or greenish, minutely dotted with black, with a rounded bluish black spot in the centre near the root ; ventrals and pectorals hyaline, the latter in some with a black spot along the root. Iris silvery, orbital margin bluish black.

D 13, C $15\frac{2}{3}$, A 16, V 6, P 10, Br. XII?

HABIT.—*Sea of Pinang, Malayan Peninsula.*

Bombay, Aleppee (in fresh water), Coromandel, Gangetic estuaries, Rangoon, Canton, River Brunai (Borneo), Port Essington, North Australia.

TOTAL LENGTH: 1 ft. 1 inch.

In an individual of the length given the head was contained $2\frac{3}{4}$ times in the total length. The vertical diameter at occiput was $\frac{1}{2}$ of the length of the head. The horizontal diameter of the eye was $10\frac{1}{2}$ of the length of the head, measured from the symphysis of the lower mandible, and $\frac{1}{4}$ of the distance from the anterior margin of the orbit. The abdominal crest becomes most distinct on the tail. The internal series of long sharp teeth appear proportionally shorter in this than in the preceding species. The tongue is smooth. On the inside of the lower mandible is a bony, grated ridge like that of the preceding species, and *Belone cancila* (Buchan. Ham.) is provided with a similar. Single individuals, all of nearly equal length, occur at Pinang at all seasons. They are eaten by the natives.

GEN. HEMIRAMPUS, Cuvier, 1817.

Upper jaw very short, formed by the intermaxillaries ; symphysis of lower jaw extended into a long point, behind which on the margins of

both jaws a narrow band of small teeth; scales large, rounded, forming a carinated range on each side of abdomen; body and fins resembling *Belone*.

HEMIRAMPHUS RUSSELLI, Cuv. and Val.

Russell, CLXXVII. Kuddera, B.

Hemiramphus brevirostris, Cuv. R. A. II. 286 (*).*

Hemiramphus brevirostris, Swainson, II. 297.

Hemiramphus russelli, Cuv. and Val. XIX. 32.

Tóda péndek† of the Malays.

Head above and back bluish black; lighter, silvery on the sides above the lateral line; rest of the sides, abdomen and opercles silvery with steel-blue reflections; fins hyaline; marginal half of dorsal and caudal minutely dotted with black; sides of lower mandible black. Iris silvery, orbital margin bluish black.

D 17, C $15\frac{3}{4}$, A 13, V 6, P 12, Br. XIII.

HABIT.—*Sea of Pinang, Malayan Peninsula.*

Coromandel.

TOTAL LENGTH: 10 inch.

The length of the head from the apex of the intermaxillaries is $\frac{1}{6}$ of the total measured to the point of the lower, longer, caudal lobe. The length of the lower jaw, from the apex to the angle of the mouth, slightly exceeds the length of the head, varying in different individuals from $\frac{1}{5}$ to $\frac{1}{6}$ of the distance to the point of the lower caudal lobe. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead equals $1\frac{1}{2}$ diameter. The depth at occiput slightly exceeds $\frac{1}{2}$ of the length of the head, and is but $\frac{2}{3}$ of the greatest vertical diameter of the body, in front of the ventrals. The length of the pectorals is $\frac{1}{6}$ less than that of the head, which is exceeded by $\frac{1}{4}$ by that of the lower caudal lobe. The upper caudal lobe is $\frac{2}{3}$ of the lower. The ventrals are placed opposite the posterior third of the distance between the apex of the intermaxillaries and the root of the

* Cuvier refers this species to Russell No. CLXXVII, and to Willughby: Append. Pl. VII. Fig. 4, two distinct species according to M. Valenciennes, who therefore has changed the specific denomination.

† *Péndek*, short. The Malays thus denominate all the species of *Hemiramphus*, to distinguish them from those of *Belone* (*Tóda*).

caudal. At Pinang this species is numerous at all seasons, but larger individuals occur at irregular intervals. They appear at European tables under the appellation of "Guard-fish."

HEMIRAMPUS GEORGII, Cuv. and Val.

Hemiramphus georgii, Cuv. and Val. XIX. 37, Pl. 555.

Tóda péndek of the Malays.

Young. Head above light greenish grey, minutely dotted with black, particularly on the intermaxillaries and about the occiput; back and sides towards the lateral line pale greenish grey; the margins of the scales minutely dotted with black; along each side a shining silvery band, divided in the middle by the lateral line, and edged above by a deep blue line; abdomen faint silvery white; opercles shining silvery with steel-blue reflections; lower jaw greenish grey with a black marginal membrane; dorsal and caudal pale greenish grey, marginal half dotted with black; rest of the fins hyaline. Iris silvery; orbital margin bluish black.

D 15 or 16, C $15\frac{3}{4}$, A 15, V 6, P 12, Br. XII?

HABIT.—*Sea of Pinang.*

Bombay, Mahé.

The length of the head from the apex of the intermaxillaries is $5\frac{1}{3}$ in the distance to the point of the lower caudal lobe. The length of the lower jaw from the apex to where the teeth of both sides meet, varies individually from $3\frac{2}{3}$ to $3\frac{1}{2}$ in the total length. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the forehead exceeds by $\frac{1}{4}$ the diameter. The arch of the roof of the orbits makes the middle of the forehead appear excavated. The depth at occiput is $\frac{1}{2}$ of the length of the head. The band of teeth of the intermaxillaries is very narrow at the angle of the mouth, gradually widening towards the apex. The inner series of these teeth are somewhat longer than the rest. The lower jaw has but a single series of minute teeth, behind which the anterior half of the mouth is lined by a crescent-shaped black membrane. The length of the pectorals is $\frac{5}{8}$ of that of the head. The ventrals are placed opposite the posterior third of the distance between the occiput and the root of the caudal. The vertical diameter in front of the ventrals is a little more than $\frac{1}{2}$ the length of the head. The caudal is but slightly cleft; the lower lobe,

but little longer than the upper, is $\frac{3}{4}$ of the length of the head. The two anterior dorsal rays are undivided. M. Valenciennes counts 17 rays in this fin, but his figure gives 16. Single young individuals occur at Pinang at all seasons.

HEMIRAMPHUS TRIDENTIFER, Cantor.

Tóda péndek of the Malays.

Head above, back and upper part of the sides light bluish green, minutely dotted with black, particularly towards the margin of the scales; along each side a shining silvery band, widening between the dorsal and anal; narrower in front of the caudal; the band edged above by a deep blue line, and longitudinally divided by the lateral line; rest of the sides and abdomen pale silvery white; cheeks and opercles shining silvery, the latter and the root of the lower jaw with strong steel-blue reflections; point of lower jaw greenish blue minutely dotted with black, with a black marginal membrane, apex red sealing-wax colour; dorsal hyaline, margins of the rays minutely dotted with black; anterior half of caudal pale greenish buff, posterior half, upper and lower margin pale blackish, rest of the fins hyaline. Iris silvery, upper half of orbital margin bluish black.

D 13 or 14, C $15\frac{3}{4}$, A 14 or 15, V 6, P 13, Br. XII or XIII.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 7 inch.

The length of the head from the apex of the intermaxillaries is $5\frac{1}{2}$ in the distance to the point of the lower caudal lobe. The length of the lower jaw from the apex to where the teeth of both sides meet varies from $6\frac{1}{2}$ to $6\frac{2}{3}$ in the total length. Measured to the angle of the mouth, the lower jaw is from $5\frac{1}{3}$ to $5\frac{2}{3}$ in the total length. The horizontal diameter of the eye is $\frac{1}{4}$ of the length of the head; the distance across the flattened forehead equals the diameter. The depth at occiput equals $\frac{1}{2}$ of the length of the head. The teeth of both jaws are placed on narrow bands; in the centre of the lower jaw there is a very minute interval between the teeth of both branches. The teeth themselves are very minute, the internal series a little longer than the rest. Examined through a lens the apex of each tooth appears compressed, terminating in three minute points of which the central one is a little longer than the two lateral. The intermaxillary forms a nearly

equilateral triangle, each side of which is $\frac{2}{3}$ of the horizontal diameter of the eye; the band of teeth of the lower jaw is longer, arched or like a horse-shoe. The length of the pointed pectorals is $\frac{3}{4}$ of that of the head; the ventrals, slightly exceeding $\frac{1}{2}$ of the pectorals, are placed far forward: they commence in the middle of the distance between the anterior margin of the orbit and the root of the caudal. The vertical diameter in front of the ventrals is $6\frac{2}{3}$ in the distance between the gill-opening and the root of the caudal. The dorsal commences a little behind the posterior third of the distance between the occiput and the root of the caudal; the extent of the base is $\frac{3}{4}$ of the length of the head; the first and second ray undivided; the latter and the third are the longest, $\frac{2}{3}$ of the extent of the base. The last ray is a little elongated. The anal is placed opposite the dorsal, which it resembles in shape and extent. The caudal is but slightly cleft; the lower lobe equals the length of the head; the upper one about $\frac{1}{5}$ less. The scales are large, rounded; the vertical diameter of the part exposed is about the double of the horizontal. The abdominal crest is distinct. This species has several characters in common with *H. gernaerti*, Cuv. and Val., but it differs from that and from all the other species by its peculiar dentition. In *Exocoetus volitans*, Lioué, the pharyngeal teeth before they become worn, are flattened and tricuspidate. Perhaps it may be inferred that the individuals of the present species are young, although the young of the preceding species have simple pointed teeth. They are numerous at all seasons at Pinang, and are eaten by the natives.

GEN. EXOCOETUS, (*Artedi*,) *Linné*, 1748.

Pectorals excessively large; head and body scaly with a salient line on each side of the abdomen; head depressed; cheeks compressed; eyes large; intermaxillaries without pedicles, forming the edge of the upper jaw; dorsal placed opposite the anal; intermaxillaries with minute pointed teeth; pharyngeals with teeth as if paved.

EXOCOETUS NIGRIPENNIS, Cuv. and Val.

Exocoetus nigripennis, Cuv. and Val. XIX. 103.

Head above, back and upper half of the sides ultramarine with

purple gloss; lower half of the sides, abdomen, cheeks and opercles light silvery ultramarine, minutely dotted with black; dorsal, ventrals and pectorals black; pectoral rays silvery sky-blue; caudal yellowish white, at the root bluish dotted with black; anterior half of ventrals hyaline, posterior black, base blue. Iris silvery, orbital half bluish black.

D 11, 12 or 13, C $15\frac{3}{5}$, A 8, 9 or 10, V 6, P 15, Br. XI.

HABIT.—*Sea of Pinang.*

China Sea.

TOTAL LENGTH: 3 inch.

The length of the head is $5\frac{1}{3}$ in the total, measured to the point of the lower caudal lobe. The horizontal diameter of the eye is $\frac{1}{2}$ of the length of the head. The arch of the roof of the orbit makes the middle of the forehead appear excavated; the distance across the forehead between the posterior angles of the orbit slightly exceeds the diameter of the eye; between the anterior angles it is slightly less than the diameter. The depth at occiput, as well as the vertical diameter in front of the ventrals, is $\frac{3}{4}$ of the length of the head. The scales of the body are rather large, and so deciduous that few are in their places. The lateral line and the salient line on each side of abdomen can barely be traced. The teeth of both jaws are excessively minute and apparently confined to the central part. Each palatal has a single external series of minute teeth, and a few scattered over the surface, which appears like a fine file. The teeth are probably deciduous, and so minute that they cannot be seen in fresh specimens, and in dried ones only by means of a powerful lens. The pharyngeal teeth are tricuspid. The lower margin of the horizontal part of the preopercle is toothed. The length of the pectorals differs individually: they do not exceed $\frac{1}{2}$ of the head and body, (the caudal not included). The ventrals are $\frac{1}{3}$ of the total length; the lower caudal lobe is $4\frac{1}{2}$ in the total length, the upper one but slightly exceeds $\frac{1}{2}$ of the former. The intestinal canal is wide at œsophagus, gradually narrowing in its straight course towards the anus. Its length is scarcely $\frac{1}{2}$ of the total. The liver consists of a single small lobe. The white air-vessel is comparatively very large, thin, elongated, its length slightly exceeding $\frac{1}{2}$ of the total. The peritoneum is silvery, sparingly dotted with black. In the course of four years ten individuals were obtained at Pinang. They occur-

red singly and at irregular intervals, and varied from two to three inches in length.

GEN. PANCHAX, Valenciennes 1846.*

Maxillary bone thrown behind the descending branch of the intermaxillary, so that but the lower part contributes to form the angle of the mouth; muzzle broad depressed; gill-openings well cleft; dorsal small, placed far back opposite the anal; intermaxillaries and lower jaw with a narrow band of minute teeth, of which the external series are longer than the rest and arched round the margin of the jaws, so as to appear like cilia; a narrow transversal band of minute teeth on the palate (vomer).

PANCHAX PANCHAX, (Buchan. Ham.)

Esox panchax, Buchan. Ham. 211, 380, Pl. III. Fig. 69.

Aplocheilus chrysostigmus, McClelland, As. Res. XIX. II. 301 and 426, Pl. XLII. Fig. 2.

Aplocheilus panchax, McClelland, *ibid.* 302.

Panchax buchanani, Cur. and Val. XVIII. 383.

Head above, back and upper half of the sides pale silvery green, minutely dotted with black; lower half of the sides and the abdomen silvery white, in some individuals with orange coloured dots; on the occiput a small oval silvery white spot; sides of the head and upper half of opercles silvery green minutely dotted with black, lower half

* In 1836, Mr. McClelland placed some species of this genus in the family of *Cyprinoidæ*, and formed a Subgenus of *Poecilia*, Bl. Schn. to receive them, viz. *Aplocheilus*, (Scr. *Hoplocheilus*)—Mr. McClelland characterises the latter as follows: "Intermaxillaries fixed, apices of the jaws flat and directed upwards; five rays in the branchial membrane; fins transparent; a short dorsal placed opposite to the last ray of a long anal; the intestine and stomach form together a small tube scarcely longer than the body; the eyes placed on the edges of the head; the mouth directed upwards; a single row of large teeth inserted along the edges of the lips which are not protractile as in *Poecilia*; the caudal entire." (*Asiatic Researches*, XIX. Pt. II. pp. 301 and 426). Of the preceding eleven characters only four are correct, but they are not sufficient to characterise the genus, viz.: apices of the jaws flat; intestinal canal scarcely longer than the body; eyes on the edges of the head; caudal entire. The remaining characters are either partly incorrect or entirely so. The characters of *Panchax*, Valenciennes, although of a later date than *Hoplocheilus*, must therefore be adopted.

white; lower jaw and the throat immediately behind minutely dotted with black, so as to appear like two narrow arched black lines; rest of the throat yellow or white; dorsal hyaline or orange with a large rounded black spot occupying the basal half; in some individuals a small white spot in front of the dorsal, in others the upper margin black; caudal greenish grey minutely dotted with black, upper and lower margin orange edged with black; anal hyaline edged and spotted with orange; ventrals and pectorals yellow. Iris reddish silvery with a blackish ring.

D 9, C $15\frac{4}{5}$, A 17, V 6, P 15, Pr. VI.

HABIT.—*Fresh water Pinang.*

Bengal.

TOTAL LENGTH: $2\frac{1}{8}$ inch.

The length of the head is $\frac{1}{4}$ of the total; the depth at occiput is $\frac{1}{2}$ of the length of the head. The horizontal diameter of the eye is a little less than $\frac{1}{4}$ of the head; the distance across the forehead equals two diameters. The nostrils open laterally by two minute apertures placed above each other in front of the anterior orbital margin. There are no lips. The intermaxillaries are very protractile, and are slightly moveable up and down like a lid. Both the external and the internal series of the teeth of the jaws, are a little longer and more distant than the rest of the teeth. Behind the intermaxillaries appears a small crescent-shaped membrane. Behind the latter are some excessively minute teeth placed on a narrow band, which crosses the vomer and forms an arch parallel with the intermaxillary teeth. The tongue is small, fleshy, and as well as the cavity of the mouth dotted with black. The body is covered by 7 longitudinal series of proportionally large scales, with concentric lines and about 13 radical rays. There are about 30 scales in a series between the gill-opening and the caudal. No lateral line is visible, but on each of the anterior 6 to 8 scales of the third series, appears a central impression as if pricked with a needle. The dorsal commences opposite the posterior third of the anal. The ventrals have no filament. It is numerous at Pinang in ponds, paddy fields and ditches. The stomach and intestines form a continued tube, in length scarcely $\frac{1}{2}$ of the total. The peritoneum is silvery, dotted with black. The number of fin rays given by Buchanan and Mr. McClelland are incorrect.

ORDO PHYSOSTOMI.

SUBORDO PHYSOSTOMI ABDOMINALES.

FAM. SILUROIDÆ.

GEN. BAGRUS, (*Rafinesque*,) Cuvier, 1817.

A band of velvety, or card-like teeth in both jaws ; on the vomer a second, posterior band, either velvety or in a single series.

BAGRUS ABBREVIATUS, Cuv. and Val.

Bagrus abbreviatus, Cuv. and Val. XIV. 420.

Pimelodus abbreviatus, Kuhl and Van. Hasselt, *ibid*.

Bagrus abbreviatus, Bleeker : Verhand. Batav. Genoots. XXI. 4.

Head above and back dark greenish olive, lighter silvery on the sides ; abdomen silvery white ; fins greenish grey ; their membranes whitish at the base, the rest minutely dotted with black ; adipose fin greenish olive minutely dotted with black ; nasal cirri grey ; maxillary black ; both mandibular pairs white. Iris greenish golden, blackish towards the orbit.

D $1\frac{1}{7}$ —1 (adipose), C $17\frac{2}{7}$, A 13, V 6, P $1\frac{1}{8}$ or 9, Br. IX.Cirri : $\frac{4}{4}$ HABIT.—*Sea and estuaries of Pinang.*

Java.

TOTAL LENGTH : 1 foot 6 inch.

The length of the head is $4\frac{1}{2}$ in the total ; the horizontal diameter of the orbit is $\frac{1}{5}$ of the length of the head ; the distance of the eyes across the head two such diameters. The long helmet is finely shagreened to between the eyes, where its breadth is $\frac{1}{2}$ of its length ; the occipital point is narrow triangular, occupying half the interval between the occiput and the dorsal spine, and receiving in a notch the point of the second interspinal. The mastoid and suprascapular processes form an elongated arch surrounding the opercle and nearly touching the humeral. The latter is elongated triangular, its length twice its height. The opercle is finely shagreened like the rest of the bones forming the helmet, and has besides some radiating lines. The greatest breadth of the head nearly equals its length, and also the greatest vertical diameter of the body, in front of the dorsal spine. The card-like teeth are disposed on narrow bands in the jaws and on the vomer.

The nasal cirri extend to the preopercle, the maxillary to the point of the ventrals, the external mandibular to the point of the pectorals ; the internal are one half of the external. The dorsal spine is rather slender, longitudinally striated, with teeth on the posterior margin, and two or three on the anterior near the apex. The length is $\frac{3}{4}$ of the first dorsal ray, which is $\frac{3}{4}$ of the length of the head. The adipose dorsal is as high as the anal, but of half the extent. Each lobe of the furcated caudal equals the head ; in young individuals the upper one terminates in a short filament. The pectoral spine is longer and broader than the dorsal ; the upper surface is lineated, the margin towards the rays is strongly toothed. At Pinang individuals occur at all seasons, but not in great numbers. They are eaten by the natives.

BAGRUS SONDAICUS, Cuv. and Val.

Bagrus sondaicus, Cuv. and Val. XIV. 444.

Bagrus sondaicus, Bleeker : Verhandel, Batav. Genoots. XXI. 4, 14,
29 and XXII. 5.

Helmet dark olive bronze, (tubercles white,) lighter on the cheeks and opercles ; back deep steel-blue with greenish reflections, the sides, to a little beneath the lateral line, lighter, silvery, with from 12 to 15 vertical bands reflecting steel grey or pale golden green ; rest of the sides and abdomen silvery white ; fins greenish grey minutely dotted with black ; external half of pectorals, anal and the lower caudal lobe blackish ; maxillary cirri black ; external mandibular white at the base, rest black ; internal maxillary white. Iris golden green, blackish towards the orbit.

D $1\frac{7}{10}$ —1 (adipose), C $15\frac{7}{10}$, A 17 or 18, V 6, P $1\frac{1}{10}$, Br. VI.

Cirri : $\frac{2}{4}$

HABIT.—*Sea of Pinang, Malayan Peninsula.*

Straits of Sunda, Java, Madura.

TOTAL LENGTH : 1 foot 9 inch.

The length of the head is $\frac{1}{5}$ of the total, slightly exceeding the greatest vertical diameter of the body, in front of the dorsal spine. The breadth of the head nearly equals the length. The horizontal diameter of the orbit is $6\frac{1}{2}$ in the length in the head. The bones forming the helmet are granulated as far as the anterior margin of the orbit, but the small triangular truncated suprascapular is like the opercle

smooth but radiated. The sides of the interspinal form an angle with the centre part, and terminate behind in a blunt point. The interparietal is broad truncated or rounded behind; its length is $\frac{1}{4}$ of the rest of the helmet, its breadth about $\frac{1}{2}$. The humeral is pointed, granulated, triangular, its length $2\frac{1}{2}$ in the head. The teeth are strong, card-like. Those on the vomer are placed on two small oval spots; those on the palate on two similar but larger, all four forming one series, broader than the maxillary ones. The palatal teeth easily fall out, which renders the fish liable to be mistaken for a species of *Arius*. The maxillary cirri reach to the point of the pectorals; the external mandibular to the base of the pectorals; the internal are $\frac{1}{3}$ of the external. The dorsal spine is $\frac{1}{3}$ of the head, granulated on the anterior half of its sides; near the apex the anterior margin carries 4 or 5 small teeth, the posterior 6 or 7 similar ones. The point terminates in a short soft filament, which is easily torn off. The pectoral spine equals the length of the head: the anterior half of the external margin is granulated; the corresponding part of the sides is lineated; the external margin carries near the point a few weak teeth, and similar appear along the internal margin. The point terminates in a soft filament, longer than that of the dorsal. The upper caudal lobe, a little longer than the lower, is $4\frac{2}{3}$ in the total length. The ventrals are $\frac{1}{2}$ of the pectorals. The extent of the adipose dorsal is $\frac{2}{3}$ of the anal. At the origin of the lateral line appear some minute elongated grains; the line itself consists of small tubes which become indistinct after it has passed the dorsal fin. This species is more or less numerous at all seasons. It is eaten by the natives and the air-vessels collected for the China market.

M. Bleeker thinks it probable that *B. javensis*, Cuv. and Val. (XIV. 445) is identical with *B. sondaicus*. [Bleeker l. c., 4(')].

GEN. *ARIUS*, Cuv. and Val. 1840.

Palatal teeth on two distinct separate plates, in some species advancing on the lateral angles of vomer.

ARIUS TRUNCATUS, Cuv. and Val.

Arius truncatus, Cuv. and Val. XV. 64.

Arius truncatus, Bleeker Verh. Bat. Gen. 4.

Head above and back intense blue with silvery reflections, cheeks and opercles golden bronze ; throat and sides golden ; abdomen silvery white, sparingly dotted with black ; fins greyish white minutely dotted with black ; margins of dorsal and caudal black ; in the adult the posterior half of the caudal and the anal pale lake ; adipose pale greyish olive minutely dotted with brown ; maxillary cirri black ; mandibular pairs white. Iris golden dotted with black.

D $1\frac{1}{7}$ —1 (adipose), C $15\frac{1}{11}$, A 23 or 24, V 6, P $1\frac{1}{9}$, Br. VI.

Cirri $\frac{2}{4}$

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula.*

Java.

TOTAL LENGTH : $11\frac{2}{3}$ inch.

The length of the head measured to the point of the opercle is a little less than $\frac{1}{4}$ of the total, but to the posterior margin of the first interspinal it is $\frac{1}{3}$ of the total. The latter bone is narrow rectangular, its breadth being $1\frac{2}{3}$ in its length which is $\frac{1}{6}$ of the distance to the muzzle. The helmet is granulated and partially striated, its anterior two thirds divided by a longitudinal furrow commencing on the forehead on a level with the nostrils. The cheeks and opercles are veined, and the latter also indistinctly radiated. The anterior half of the head is much depressed, the muzzle rounded, truncated. The teeth of both jaws are on narrow bands, card-like and finer than the palatals, which are crowded on a small oval spot on each side. The cirri are slender : the maxillary ones reach to about the middle of the opercle ; the mandibular pairs are nearly equal, $\frac{3}{4}$ of the former. The eyes are situated at the anterior third of the head, their horizontal diameter is in the young $\frac{1}{7}$ in the older $\frac{1}{8}$ of the length of the head ; their distance across the forehead is about 4 such diameters. The vertical diameter at occiput is $\frac{1}{2}$ of the length of the head ; that in front of the dorsal is a little less than $\frac{2}{3}$ of the head. The dorsal spine is strong, $\frac{3}{4}$ of the length of the head, equalling in length the first ray. The posterior margin and that part of the anterior nearest the apex are finely toothed, the rest is granulated. The pectoral spine is but $\frac{2}{3}$ of the dorsal which it otherwise resembles, but the teeth of the posterior margin are stronger. The pectorals and ventrals are nearly of equal length or about $\frac{1}{2}$ of the length of the head. The extent of the anal equals the greatest vertical diameter of the body ; the length of the eighth and ninth rays is a little less than that

of the ventrals. The extent of the adipose dorsal is $\frac{1}{3}$ of the anal, its height $\frac{1}{2}$ of the longest rays of the latter. The caudal is deeply cleft, the lobes equal, and their length, normally, like the dorsal spine. The lateral line follows the outline of the back at the upper third of the body; arrived at the base of the caudal it continues a short distance obliquely downwards over the three upper rays of the lower lobe. The line consists of little separated tubes, each with a minute downwards pointed process at the posterior part. The two superior branchiostegous rays on each side are very broad and exposed, so as to appear like a subopercle. The stomach is capacious, thin, containing remains of *Crustacea* and mud. The intestinal canal slightly exceeds double the total length. The air-vessel is small but very thick transversely divided in two compartments. The fish is held in esteem by the natives, but at Pinang it is of so rare occurrence that the air-vessel contributes but little to the general stock of Isinglass obtained from other species.

ARIUS ARIUS, (Buchanan Hamilton.)

Pimelodus arius, Buchan. Ham. 170, 376.

Arius arius, Cuv. and Val. XV. 102.

Ikan Salúdu or Surdúdu.

Adult. Head above and back intense steel-blue; cheeks, opercles and sides greenish golden or bronze; throat and abdomen white slightly dotted with black; dorsal greyish white minutely dotted with black; filament of the spine and the upper margin black; caudal yellowish white minutely dotted with brown; anal and pectorals white, external half so closely dotted with black as to assume that colour; ventrals hyaline, closely dotted with brown; adipose pale greyish olive with a large black spot, posterior margin white; maxillary cirri blackish; mandibular pairs white. Iris greenish golden, orbital margin blackish.

Young. Dorsal, posterior half of caudal, middle of anal and base of adipose pale lake.

D 17—1 (adipose), C $15\frac{8}{8}$, A 18 to 21, V 6, P 1/10, Br. V.

Cirri $\frac{2}{4}$

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singapore.*

Pondicherry, Gangetic estuaries.

TOTAL LENGTH: 1 foot 10 inch.

The length of the head is $\frac{1}{4}$ of the total. The helmet is granulated to the middle above the orbit. The first interspinal is rectangular nearly square, its length $\frac{1}{6}$ of the distance to the muzzle; the posterior margin is notched, receiving a broad point from the crescent-shaped second interspinal. The anterior two thirds of the helmet are divided by a broad longitudinal furrow. The interopercle and opercle are radiated, the point of the latter indistinctly granular. The horizontal diameter of the orbit is $\frac{1}{4}$ of the length of the head. The teeth of the jaws are card-like, on narrow bands. Those of the palate are granular, placed on two close oval spots. The maxillary cirri do not quite reach to the apex of the pectoral spine; the external mandibular pair is $\frac{1}{5}$ shorter; the internal is $\frac{1}{2}$ of the external. The vertical diameter in front of the dorsal slightly exceeds the length of the head, and equals the length of the dorsal spine. The latter is very strong, the posterior margin and the anterior near the apex are toothed, the rest is coarsely granulated. To the apex is attached a soft filament, seldom exceeding $\frac{1}{2}$ the length of the spine. The pectoral spine resembles the former, but it is slenderer, shorter by $\frac{1}{4}$, and without filament. The extent of the adipose is $\frac{1}{2}$ of that of the anal; its height $\frac{1}{3}$ of the length of the sixth and seventh rays, which is $\frac{1}{2}$ of the head. The caudal lobes equal the length of the head. The lateral line resembles that of *Arius truncatus*, but it keeps nearer to the middle of the body. At Pinang smaller individuals of this species are very numerous at all seasons. They form an article of food, and contribute more than any other of the *Siluroideæ* to the exportation of Isinglass.

ARIUS MILITARIS, (Linné.) ?

Silurus militaris, Linné : Syst. 1356. ?

Arius militaris, Cuv. and Val. XV. 114, Pl. 430.

*Osteogeneiosus** Bleeker : Verhandel. Batav. Genootsch. XXI. 49.

Head above and back bottle-green bronze, lighter on the sides of the head and body; abdomen silvery white, anterior half minutely dotted with brown; dorsal and caudal pale greyish olive, minutely dotted with

* *OSTEOGENEIOSUS*, Bleeker, 1847, (Scrib. *OSTEOGENIUS*.) Teeth on the anterior part of the palate disposed in two oblong arched groups; two supra-maxillary bony, rigid cirri; branchiostegous rays five. Otherwise resembling *Arius*.

black, margin blackish ; rest of the fins white ; upper half between anterior four rays of ventrals dotted with black ; upper surface of pectorals and posterior half of lower black, in the axilla a black spot along the root of pectorals ; jaws and root of the long cirrus-like maxillary prolongation blackish bronze, rest of the latter reddish white ; adipose fin greenish olive dotted with black, posterior margin white. Iris greenish golden dotted with black.

D 17—1 (adipose), C $15\frac{6}{8}$, A 21, V 6, P $1\frac{1}{10}$, Br. V.

Cirri $\frac{2}{0}$

HABIT.—*Sea and estuaries of Malayan Peninsula and Islands.*

Sea and estuaries of Malabar, Coromandel ; estuaries of
Ganges and Irawaddy.

TOTAL LENGTH : 1 foot 6 inch.

The length of the head is $4\frac{1}{2}$ in the total. It is completely covered by smooth skin, and but a few granulations appear on the anterior part of the elliptic interparietal. The rest of the bone, like the opercles, is radiated ; it occupies $\frac{1}{4}$ of the distance from the muzzle. The horizontal diameter of the eye is $\frac{1}{6}$ of the length of the head ; the distance across the forehead is about three such diameters. The card-like teeth of the jaws are on broad bands ; that of the upper one is the shorter, as it does not reach to the angle of the mouth, but terminates at the root of the bony cirrus-like elongation of the upper maxillary bone. The latter is slender, elastic, flattened with a shallow furrow on each side ; its length equals the head ; the anterior sixth is attached to the side of the head by a small triangular membrane which is, however, too short to admit of the bone being projected at a right angle. The palatal teeth are granular, placed in two separated groups of an irregular rhomboidal shape. The vertical diameter of the body, in front of the dorsal, is $\frac{3}{4}$ of the length of the head. The dorsal spine is slender, the lower half of the anterior margin is finely granulated, the upper half and the posterior margin are very finely toothed ; it is a little shorter than the first ray which is $\frac{2}{3}$ of the length of the head. The pectoral spine resembles the dorsal and is but a little shorter. The extent of the anal is $\frac{1}{6}$ of the length of the body ; the eighth, the longest ray, slightly exceeding $\frac{1}{2}$ of the extent. The extent of the adipose fin is about $\frac{1}{3}$ of the anal, but of nearly equal height. The caudal is

slightly cleft, and the lobes a little rounded; their length is $\frac{1}{7}$ of the total. The lateral line resembles that of *Arius truncatus*. At Pinang single individuals occur at all seasons; they are eaten by the natives, and their air-vessels preserved.

GEN. PIMELODUS, (*Lacépède*, 1803,) *Cuv. and Val.* 1840.

Palate smooth, without teeth; six or eight cirri; with or without helmet.

PIMELODUS PECTINIDENS, Cantor.

Young? Head above and back yellowish green bronze, dotted with black; between the anterior points of the helmet an oval yellowish white spot, cheeks, opercles and sides of the body silvery; the two first minutely dotted with black; throat and abdomen white; fins, including the adipose, yellowish white; maxillary cirri black; mandibular pairs white. Iris golden minutely dotted with black.

D $1\frac{1}{7}$ —1 (adipose), C $15\frac{8}{9}$, A 20, V 6, P $1\frac{1}{8}$, Br. IV.

Cirri $\frac{2}{4}$

HABIT.—*Freshwater, Pinang.*

TOTAL LENGTH: $4\frac{2}{8}$ inch.

The greatest vertical diameter of the body, in front of the dorsal fin, is $\frac{1}{5}$ of the total length; from thence the profile descends in a nearly straight line to the rounded muzzle. To the point of the opercle the length of the head is $\frac{1}{5}$ of the total, but to the point of the interparietal bone it is $3\frac{3}{4}$. Above the head is depressed, transversely arched, its greatest breadth at the occiput is $\frac{1}{5}$ less than its length. The interparietal is triangular truncated, its length $\frac{1}{5}$ of the distance to the muzzle, its breadth at the base equals its length; the truncated apex is notched, receiving the point of the second interspinal. The whole of the helmet is finely granulated to above the posterior margin of the orbit. It is longitudinally divided by a furrow terminating a little behind the anterior half of the distance between the muzzle and the dorsal. The suprascapular bone is narrow, pointed, and joins the equilateral triangular humeral. Both as well as the opercles are rough and striated. The size of the opercle equals that of the preopercle and interopercle together. The cheeks are smooth. The mouth is large, the angle reaching to the posterior margin of the orbit; the fleshy

lips completely hide the teeth; the upper jaw projects beyond the lower. In each jaw appears a single series of closely set, small, flattened teeth, resembling a fine comb. To the naked eye the apex of the teeth appears to be truncated, trenchant, but under a lens it is bluntly trilobate. The cirri are very fine: the maxillary reach to the preopercle, the mandibular pairs are so short as to easily escape observation. The nostrils open closely in front of the orbit. The latter occupies the second fourth of the head, a little nearer to the jaw than to the forehead; the greatest diameter, obliquely downwards, is a little less than $\frac{1}{4}$ of the length of the head. Of the four branchiostegous rays, the two upper ones are longer and broader than the lower. The dorsal spine is strong and nearly as long as the head, the two sides are striated, the lower half of the anterior margin is granulated, the upper half of this and of the posterior margin is finely toothed; the first ray is a little longer than the spine. The pectoral spine is a little shorter than the dorsal, which it otherwise resembles. The ventrals are $\frac{2}{3}$ of the length of the head. The extent of the base of the anal is $\frac{3}{4}$, the eighth ray $\frac{2}{3}$ of the length of the head. The adipose dorsal fin is placed opposite the middle of the anal; its base and length are $\frac{1}{2}$ of the latter. The posterior margin of the caudal is nearly crescent-shaped; the upper lobe slightly longer than the lower, is $4\frac{1}{2}$ in the total length. The lateral line resembles that of *Arius truncatus*. A single individual was observed at Pinang in August 1844. The yellowish white oval spot on the forehead is in some other *Siluroideæ* characteristic of immaturity. It may perhaps also be so in this species, notwithstanding the worn appearance of the trilobate teeth.

GEN. CLARIAS, (Gronov. 1763,) Valenciennes, 1840.

(COSSYPHUS, McClelland, 1843.*—PHAGORUS, McClelland, 1844.)

Head with a long, granular helmet, formed by the cranial and supra-

* Sir John Richardson in his Report, 1845, p. 287, observes, that "*Cossyphus ater*, McClelland, (Calcutta Journ. IV. p. 403, Pl. 22, Fig. 3,) is apparently an injured example of this genus," (*Plotosus*, apud Richardson.)

Cossyphus ater, McClelland, is founded upon a mutilated specimen of either *Clarias jagur*, (*Macropteronotus jagur*, Buch. Hamilton, 145, 374,) or upon a closely allied species, but more probably upon the former. Mr. McClelland later substituted *Phagorus* for *Cossyphus* (Calcutta Journ. V. 225, *Errata*).

scapular bones; the interparietal advancing on the occiput as a more or less soft lamina, supported by the occipital crest; card-like or granular teeth on the vomer; dorsal without spine, occupying nearly the whole of the back; anal less extensive; margin of pectoral spine minutely toothed; on each side two ramified branchial appendages; branchiostegous rays 9 to 11.

CLARIAS PUNCTATUS, Cuv. and Val.

Clarias punctatus, Cuv. and Val. XV. 384.

Clarias punctatus, Bleeker: Verhandel. Bat. Genoot. XXI. 4, 17, 53.

Head, body, fins, and cirri blackish brown; with purple or lilac reflections; body either uniformly so or with large irregular lighter spots, with eight to ten vertical series, each consisting of four to six whitish dots, in number and distribution liable to individual variations; pectoral spine, throat, and abdomen as far as the ventrals, brownish white. Iris dark brown.

D 70, C $17\frac{4}{4}$, A 51 to 53, V 6, P $1\frac{1}{8}$, Br. IX.

Cirri $\frac{4}{4}$

HABIT.—*Estuaries and freshwater, Pinang.*

Java.

TOTAL LENGTH: 10 inch.

Measured to the apex of the interparietal, the head slightly exceeds $\frac{1}{4}$ of the total length, (to the point of the opercle it is $\frac{1}{6}$); the breadth between the gill-openings is $\frac{3}{4}$ of the length. The eye is situated at the anterior fourth, its horizontal diameter is $\frac{1}{9}$, and the distance across the forehead is $2\frac{1}{2}$ in the length of the head to the apex of the interparietal. The latter is triangular with the apex rounded, the base double the length, which is $\frac{1}{8}$ of the distance to the muzzle. In the centre of the helmet appear two ovoid apertures, covered by the integuments: the anterior is $\frac{1}{5}$, the posterior $\frac{1}{10}$ of the length of the head. The maxillary cirri slightly exceed $\frac{1}{4}$ of the total length, nearly reaching to the apex of the pectoral spine; the nasal are $\frac{1}{6}$, the outer mandibular $\frac{1}{5}$, and the inner mandibular $\frac{1}{8}$ of the total length. The teeth are card-like: those of the upper jaw on a broad band, reaching to the root of the maxillary cirri; those of the vomer and palate forming a narrow crescent. The dorsal fin commences at a distance from the apex of the interparietal, equalling $\frac{1}{7}$ of the length of the head. The pectoral spine

is strong, like a sabre: the surfaces finely striated, the outer margin finely granulated with two or three teeth near the apex, the inner finely toothed; the length of the spine is $7\frac{1}{2}$ in the total; the first rays are a little longer. The ventrals are situated at the anterior third of the total length, in which they are contained $10\frac{1}{2}$ times. Between the anus and the anal fin appears a short conical appendage. The length of the caudal is $7\frac{3}{4}$ in the total. The stomach is a short rounded sac, the intestinal caudal is about $\frac{1}{2}$ of the total length; the liver is divided in two short lobes; the left is again subdivided in two; the gall is oval, large; the spleen is small, flattened, oval. The posterior branchial appendage is large, nearly double the size of the anterior. This species is numerous at all seasons. It is eaten by the poorer classes of natives.

GEN. *OTOSUS*, Lacépède, 1803.

Body elongated, terminating in a compressed point; two dorsals, of which the second, caudal and anal united; head naked; strong conical teeth in the jaws and vomer; eight short cirri; behind the conical anal papilla a small ramified appendage.

OTOSUS ANGUILLARIS, (Bloch.)

Renard, I. Pl. III. Fig. 19. Sambalang.

Valentyn, No. 496, Ikan binara.

Silurus arab, Forskål, XVI. No. 36?

Platystachus anguillaris, Bloch, Tab. 373, Fig. 1.

Plotose anguillé, Lacép. V. Pl. III. Fig. 2.

Russell, CLXVI. Ingeelee.

Platystachus anguillaris, Shaw, V. 30, Pl. 99.

Krusenstern: Voyage, Pl. LX. Figs. 12 and 13.

Duperrey: Voyage, Poiss. Pl. XXXI. Fig. 3.

Plotose ikapou, Lesson: Dict. Class. d'Hist. Nat. XV. 435.

OTOSUS anguillaris, Cuv. R. A. II. 297(').

OTOSUS marginatus, Bennett: Life of Raffles.

OTOSUS anguillaris, Rüppell: Neue Wirb. Fische, 76.

OTOSUS vittatus, } Swainson, II. 307.

Clarias anguillaris, }

OTOSUS lineatus, Cuv. and Val. XV. 412.

OTOSUS lineatus, Richardson: Report, 1845, 286.

Plotosus lineatus, Temm. et Sehl. Fauna Jap. Pisc. 228, Pl. CIV.
Fig. 3.

Plotosus lineatus, Bleeker : Verh. Bat. Gen. XXI. 4, 17, 57.

Similang károng of the Malays.

Young. Head above and back blackish olive, lighter or copper coloured on the sides of the head and body ; two white bands along the body : one from the muzzle above the eye along the back, a second, broader, from the maxillary cirrus, and in some a third from the ventrals ; lips, throat and abdomen white ; fins pale brownish olive or lake, dotted and edged with black ; upper part of first dorsal with a black spot ; anal papilla and ramified appendage crimson ; nasal and maxillary cirri blackish ; mandibular pairs white. Iris golden dotted with black.

Adult. The lateral white bands indistinct.

1st D $1\frac{1}{4}$,—2d D, C and A 172 or 173, V 13 or 14, P $1\frac{1}{11}$,

Br. XI or XII.—Cirri $\frac{4}{4}$

HABIT.—*Sea and estuaries of Malayan Peninsula and Islands.*

Isle of France, Society- and Friendly Islands, Japan, Philippines, China Seas, Amboyna, Celebes, Java, Seychelles, Red Sea, Malabar, Ceylon, Coromandel, Western Australia.

TOTAL LENGTH : 10 inch.

The length of the head is $5\frac{1}{2}$ in the total, its depth at occiput $\frac{1}{2}$ of the length. The horizontal diameter of the eye is $\frac{1}{6}$ of the length of the head ; the distance across the forehead 2 such diameters. The greatest vertical diameter of the body, in front of the first dorsal, is $\frac{1}{9}$ of the total length. The maxillary and external mandibular cirri are equal, both pairs less than $\frac{1}{2}$ of the length of the head. The nasal and internal mandibular pairs are shorter. This species is very numerous at all seasons. In the stomach of those dissected was found *Modiola faba*, Benson, a very small bivalve inhabiting the Malayan estuaries.

Plotosus albilabris, Cuv. and Val.

Plotosus albilabris, Cuv. and Val. XV. 427.

Plotosus albilabris, Bleeker : Verh. Bat. Gen. XXI. 4.

Similang of the Malays.

Young. Head above and back blackish olive, lighter on the sides of the head (cheeks pale bluish), and of the body above the lateral line; beneath the latter, the throat and abdomen impure bluish white; lips pale blackish; body everywhere closely dotted with brown; pectorals blackish above, whitish beneath; rest of the fins pale greyish olive minutely dotted and edged with black; cirri blackish, root of mandibular pairs whitish; anal papilla and ramified appendage crimson. Iris golden dotted with brown.

1st D $1\frac{1}{4}$, V 13, P $1\frac{1}{9}$, Br. XII.—Cirri $\frac{4}{4}$

M. M. Cuvier and Valenciennes count: 2d D 109, C 11, A 97,
(total: 217).

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula.*

Batavia.

TOTAL LENGTH: $6\frac{4}{8}$ inch.

The length of the head is $\frac{1}{6}$ of the total; the depth at occiput little more than $\frac{1}{2}$ of the head. The horizontal diameter of the eye is $\frac{1}{6}$ of the head, the distance across the forehead two such diameters. The nasal cirri are a little longer than the head, the maxillary a little shorter and slenderer, the outer mandibular are $\frac{2}{3}$ of the latter, the inner pair slightly shorter. M. M. Cuvier and Valenciennes describe the maxillary cirri as $\frac{1}{3}$ shorter than the nasal, but the outer mandibular pair as long as the latter. All the teeth are strong, conical. The greatest vertical diameter in front of the first dorsal is $\frac{1}{7}$ of the total length. The dorsal spine is $\frac{1}{2}$ of the length of the head and but little shorter than the first ray. The pectoral spine is slenderer than the dorsal, the first ray slightly exceeds $\frac{1}{2}$ of the length of the head. The ventrals are $\frac{1}{3}$ shorter than the pectorals. The caudal is oval, rounded. The lips are fleshy and papillular. Minute papillæ appear here and there on the body. The conical anal papilla is rather large, and the ramified appendage longer and with a greater number of branches than in *P. anguillaris*.—At Pinang, the present species is less numerous than the former. The wounds of both are equally dreaded, and both are eaten by the poorer classes of natives.

FAM. CYPRINOIDÆ.

GEN. CAPOETA, Cuv. and Val. 1842.

Third bony dorsal ray toothed; a filament at the angle of the mouth; body compressed, covered with large scales.

CAPOETA MACROLEPIDOTA, Kuhl and Van Hasselt.

Capoeta macrolepidota, Cuv. and Val. XVI. 280, Pl. 477, (*Young*.)

Adult. Head above brownish olive; back silvery greenish olive, lighter on the upper half of the sides, the rest and abdomen light golden; all the scales edged with pale brown, some with a pale dark spot at the root; the oblique series in front of the dorsal fin greenish olive, forming a dark obliquely backwards-directed band, interrupted by the lateral line; opercles and cheeks shining iridescent silvery; between the eye and the angle of the mouth a blackish blue triangular spot terminating in lines radiating towards the preopercle; lips and cirri minutely dotted with black; fin-membraues transparent; rays buff minutely dotted with black: the three first dorsal, and the first pectoral blackish; caudal with a broad blackish brim above and below. Iris golden, upper orbital half black.

Young. Differs from the adult in having the dark oblique band in front of the dorsal more distinct and reaching to the abdomen; cheeks uniformly silvery without any spot.

D $3/8$, C $19\frac{5}{8}$, A $2/5$ or 6, V $2/8$, P 16, Br. III.

HABIT.—*Freshwater, Pinang.*

Java, Tenasserim.

TOTAL LENGTH: 11 inch.

The length of the head is $4\frac{1}{6}$ in the total; the depth at occiput $\frac{2}{3}$ of the length of the head. The eye, bordering on the profile, occupies the second fourth of the head, that being the length of its horizontal diameter; the distance across the forehead is $1\frac{1}{3}$ diameter. The opercles and cheeks are naked. Four large infraorbitals surround the orbit. From the temple round the lower margin of the orbit over the infra-orbital proceeds a tube, which sends downwards several shorter ones. The openings of the nostrils are situated close in front of the eye: both are separated by a projecting fleshy septum. The lips and tongue are fleshy; on the symphysis of the lower jaw appears a small protuberance. Behind both jaws appears a crescent-shaped fold of the membrane lining the mouth. The small filament at the angle of the mouth is $\frac{2}{3}$ of the horizontal diameter of the eye. The greatest vertical diameter of the body, in front of the dorsal, is $4\frac{1}{2}$ in the total length. The sides are covered by 7 longitudinal series of large rhom-

bic scales, of which there are 27 or 28 on the lateral line. The latter consists of a simple tube on each scale, of which the anterior five of the series deviate obliquely downwards, the rest, (on the third series from below,) proceed straight to the caudal. All the scales have from 4 to 10 backwards radiating lines. The first dorsal ray is excessively short; the third, the longest, is $\frac{3}{4}$ of the length of the head and has a few minute teeth in the middle of the posterior margin; the caudal lobes equal the length of the head; the length of the anal and ventrals is $\frac{1}{2}$ of the latter; the first ventral ray is short and very slender; the length of the first pectoral ray, which has a few teeth on the outer margin near the root, equals that of the first dorsal. The latter is represented a little too short in the otherwise correct figure of M. M. Cuvier and Valenciennes. At Pinang the fish is not numerous. It is of good flavour. It rises to insects, remains of which were found in the stomach. The length of the intestinal canal exceeds by $\frac{1}{2}$ the total; the stomach as well as the intestines are very thin. The air-vessel is very large, thin, white, consisting of two elongated oval portions, of which the anterior is truncated in front.

GEN. LEUCISCUS, *Rondelet*, 1554.

SUB GEN. LEUCISCUS, *Valenciennes*, 1844.

Neither spines nor cirri; dorsal and anal fins short.

LEUCISCUS RASBORA, (Buchan. Ham.)

Cyprinus rasbora, Buchan. Ham. 329, 391, Pl. II. Fig. 90.

Leuciscus rasbora, Cuv. R. A. II. 276 (°).

Leuciscus rasbora, McClelland: As. Res. XIX. 292 and 407.

Cyprinus (*Leuciscus*) *rasbora*, Cuv. and Val. XVI. 438.

Head above, back and upper part of the sides yellowish green, the root and edges of the scales minutely dotted with black; along the middle of the side a longitudinal golden stripe, bordered beneath by an indistinct bluish black one; lower half of the side and abdomen silvery pale yellow; cheeks and opercles shining silvery, the latter with blue reflections dotted with black; caudal pale yellowish dotted with black, posterior margin blackish; rest of the fins whitish transparent. Iris silvery, orbital margin bluish dotted with black.

D 9, C $19\frac{5}{8}$, A 8, V 9 or 10, P 13, Br. III.

HABIT.—*Freshwater, Pinang.*

Freshwater, Bengal, Upper Assam.

TOTAL LENGTH : $4\frac{1}{8}$ inch.

The length of the head is $4\frac{1}{2}$ in the total. The eye is situated a little in front of the second third of the head, bordering on the profile, its horizontal diameter is $3\frac{1}{3}$ in the length of the head, the distance across the forehead is $1\frac{1}{4}$ diameter. The cavity of the mouth is minutely dotted with black. As observed by Buchanan, the lower jaw terminates in a point, surmounted by a small tubercle which fits into a corresponding notch of the upper jaw. But of a number examined at Pinang none presented three prehensile knobs on the lower jaw, as described by Mr. McClelland in a specimen collected in Upper Assam by the late Mr. Griffith. The greatest vertical diameter of the body, in front of the dorsal, slightly exceeds the length of the head. The sides are covered by 7 longitudinal series of large rounded scales, each with a number of lines radiating from the root. A straight line from the gill-opening to the caudal contains 23. The lateral line proceeds obliquely downwards to near the termination of the pectoral fin, from whence it continues on the sixth, the penultimate series of scales, straight to the caudal. The first dorsal ray is situated a little behind the second half of the distance between the muzzle and the caudal, opposite the posterior ventral ray. The second dorsal ray, the longest, nearly equals the first pectoral ray, both are about $\frac{3}{4}$ of the length of the head. The lower caudal lobe, a little longer than the upper, slightly exceeds the length of the head. The first ventral and the second anal ray are nearly equal, a little shorter than the second dorsal ray. At Pinang this species is numerous in rivulets and in rice fields, when they are flooded.

FAM. SCOPELINOIDÆ.

GEN. SAURUS, *Cuvier*, 1817.

(HARPODON, *Lesueur*, 1825.—LAURIDA, [*Aristoteles*,] *Swainson*, 1839.—TRIURUS, *Swainson*, 1839.)

Muzzle short ; mouth extending far behind the eyes ; edge of upper jaw entirely formed by the intermaxillaries ; numerous pointed teeth

in both jaws, on the palatals, tongue and pharyngeals, but none on the vomer;* anterior dorsal a little behind the large ventrals; body, cheeks and opercles scaly; from 8 to 15 branchiostegous rays.

SAURUS BADI, Cuvier.

Russell, CLXXII. Badi Mottah.

Saurus badi, Cuv. R. A. II. 314(1).

Saurus badimottah, Rüppell: Neue Wirbelth, Fische, 77.

Head above, back and sides above the lateral line dull greenish olive, or greyish green; rest of the body pale silvery white; cheeks and opercles pale silvery olive with rose-coloured and bluish reflections; dorsal rays pale yellowish, membrane hyaline minutely dotted with black; second dorsal pale flesh-coloured, anterior margin blackish; caudal yellowish, minutely dotted with black, posterior half blackish; anal and ventral rays pale yellowish, membrane hyaline; pectorals pale yellowish, posterior half blackish. Iris silvery olive.

D 11 or 12—1 (adipose), C $19\frac{5}{5}$, A 10 or 11, V 9, P 15, Br. XII, XIII, or XIV.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Coromandel.

TOTAL LENGTH: 1 foot.

The length of the head is $\frac{1}{3}$ of the total. The horizontal diameter of the orbit is $4\frac{1}{2}$ in the length of the head; the distance across the forehead, as well as the distance from the orbit to the muzzle, equals one diameter. The eye is covered by a broad, transparent adipose membrane with a circular pupillary aperture. The angle of the mouth is situated at the posterior third of the head. The teeth of both jaws are placed in 5 to 6 series, of which the internal one carries the longest and most distant teeth; the rest gradually decrease in length towards the external series of teeth which are minute, card-like and erect, not obliquely forwards pointed like the rest. With the exception of the anterior four or five anterior teeth of each palatal, the rest as well as the pharyngeals, hyoid and lingual teeth are all smaller and pointing backwards. On the vomer appears a double series of excessively minute pointed teeth, forming a short transversal line which unites

* *Saurus badi* has a few minute teeth on the vomer.

the palatal series. The teeth of the vomer are deciduous, and may from their diminutive size easily escape observation. The vertical diameter at occiput is $\frac{1}{11}$, in front of the anterior dorsal $\frac{1}{7}$, and at the root of the caudal $\frac{1}{16}$ of the total length. The sides are covered by 11 longitudinal series of rounded, finely concentrically striated scales, with 3 radiating lines at the radical part. Each scale has a central rather obsolete keel. The lateral line occupies the sixth series which is a little nearer to the back than to the abdomen. It contains upwards of 60 scales, triangular, a little smaller than the rest, each with a small trifid tubercle in front of the central keel, which is sharper than that of the rest of the scales and forms a continued ridge. The latter becomes very marked behind the second dorsal, so as to resemble that of the *Scombroidea*. The anterior dorsal occupies the middle of the back between the muzzle and the caudal; the second ray is the longest, $\frac{3}{4}$ of the length of the head; of which the extent of the base is $\frac{1}{2}$. The ventrals are placed in front of the preceding fin; the first ray commences in the centre between the muzzle and the first anal ray; the penultimate ray, the longest, is $\frac{2}{3}$ of the length of the head; outside the root of the fin appears an elongated scale, $\frac{2}{3}$ of the longest ray. The first anal ray commences opposite the centre, between the last dorsal ray and the root of the caudal; the second ray, the longest equals the extent of the base which is $\frac{1}{2}$ of the length of the head. The second small adipose dorsal is placed opposite the two posterior anal rays. The caudal is covered with minute scales; the upper lobe, which is generally a little longer than the lower, equals the length of the head. The length of the pectorals is $\frac{1}{2}$ of that of the head; in the axilla appears a short broad triangular scale. Single individuals occur at Pinang at all seasons. They are eaten by the natives, although they are reputed to be very insipid.

SAURUS TRACHINUS, Temminck and Schlegel.

Saurus trachinus, Temm. et Schl. Fauna Japon. Pisces,
231, Tab. CVI. Fig. 2.

Young. Head above, back and sides above the lateral line light greenish olive, rest of the body silvery white; above the lateral line three parallel light blue longitudinal bands; beneath the line three or four similar but paler bands, all commencing at the gill-opening, termi-

nating at the root of the caudal; behind the posterior margin of opercle an oblique black spot terminating at the root of the pectoral; cheeks and opercles silvery light greenish olive, with light blue and rose-coloured reflections; caudal bright yellow; adipose dorsal pale yellowish olive; rest of the fins hyaline, anterior dorsal and ventral rays pale yellowish. Iris silvery light greenish olive.

D 12 or 13—1 (adipose), C $19\frac{6}{9}$, A 15 or 16, V 8, P 12, Br. XII.

HABIT.—*Sea of Pinang.*

Japan.

TOTAL LENGTH: 6 inch.

The head bears a general resemblance to the Gen. *Trachinus*, Linné; the upper surface is scaleless, and like the infraorbitals full of minute radiating asperities; the central line of the head is smooth, and forms a narrow sulcus between the orbital arched. The length of the head is $4\frac{1}{4}$ in the total length. The horizontal diameter of the orbit is $\frac{1}{5}$ of the length of the head, the distance of the orbit from the muzzle is $\frac{2}{3}$ diameter, of which the distance across the forehead is $\frac{1}{2}$. The angle of the mouth is situated a little behind the anterior half of the head. In each jaw appear but two series of teeth; in other respects the dentition is similar to that of *S. badi*, but there are no teeth on the vomer. The subopercle, the largest, is rounded, membranous behind, and sends a narrow pointed process up between the triangular opercle and the narrow crescent-shaped preopercle; the interopercle is triangular and but little smaller than the opercle. The vertical diameter at occiput is $6\frac{1}{2}$, at the anterior dorsal $\frac{1}{8}$, and at the root of the caudal $15\frac{1}{2}$ in the total length. The body is covered by 11 longitudinal series of scales resembling those of *S. badi*, but those immediately behind the occiput have near the posterior margin some radiating short furrows. The lateral line occupies the fifth series, and contains upwards of 60 scales; those of the anterior half of the line consist of a small tubercle terminating in 4 to 8 digitations; the rest are simple, tubular. The line itself is much less raised than in *S. badi*. The first ray of the anterior dorsal is a little nearer to the muzzle than the last dorsal ray is to the root of the caudal. The third ray, the longest, is $\frac{7}{11}$ of the head and equals the extent of the base, of which the posterior ray is a little more than $\frac{1}{2}$. The ventrals are placed in front of the anterior dorsal; the first ray, the shortest, commences in the centre between the muzzle and the first

anal ray; the sixth ray is the longest, equalling the third dorsal ray; the root of the fin is on each side enclosed by an elongated scale, $\frac{1}{2}$ the length of the sixth ray. The first anal ray is placed much farther forwards than in *S. badi*: it commences in the centre between the first ventral ray and the root of the caudal. The rays are nearly equal, or about $\frac{1}{3}$ of the extent of the base, which is but little shorter than the head. The minute adipose dorsal is placed at the posterior third of the distance between the last dorsal ray and the root of the caudal, opposite the posterior fifth of the anal. The caudal is but slightly cleft; each lobe equals the third dorsal ray. The pectorals are short triangular, slightly exceeding $\frac{1}{3}$ of the head. The stomach is capacious, cylindrical, $\frac{1}{4}$ of the total length; its contents shrimps. The intestinal canal is a simple narrow tube, a little less than $\frac{1}{2}$ of the total length; from pylorus commences a single series of 15 linear appendicula cœcopylorica, each about $\frac{1}{12}$ of the length of the intestinal canal. Two individuals, of 5 and 6 inches in length, occurred together at Pinang in February 1845. The fishermen were not acquainted with the species.

(HARPODON,* *Lesueur*.—TRIURUS,† *Swainson*.)

SAURUS NEHEREUS, (Buchanan Hamilton.)

Russell CLXXI. Wana Motta, (*Adult*.)

Osmerus? nehereus, Buch. Ham. 209, 379, (*Adult*.)

Salmo (Harpodon) microps, Lesueur: Journ. Philad. Acad. V.
48, Pl. III. (*Young*.)

Saurus ophiodon, Cuvier, R. A. II. 314, (*Adult*.)

Laurida microps, Swainson, I. 246, Fig. 49, (*Young*.)

Harpodon microps, Swainson, II. 288, Vol. I. Fig. 49.

Triurus microcephalus, Swainson, II. 288, (*Adult*.)

Bummaloh, or Bombay Duck, Cantor: Journ. R. A. Soc.
V. 168.

* Founded upon a mistake, pointed out by Cuvier, R. A. II. 314 (2).

† Preoccupied by *Triurus*, Lacépède, 1800, (*Muraenoidæ*.) Mr. Swainson's Genus is founded upon Russell's No. CLXXI. Wana Motta, which is identical with *Harpodon microps*, Lesueur, quoted by Mr. Swainson as a distinct species.

Royle : On the Prod. of Indian Isinglass, 65.

Saurus nehereus, Richardson : Report, 1845, 301.

Saurus ophiodon, Bleeker : Verh. Batav. Gen. XXII. 6.

Lúli of the Malays.

Head above, back and sides light grey or dust-coloured, hemitransparent like gelatine, with minute starlike black and brownish dots; anterior part of abdomen pale silvery bluish; rest whitish; cheeks and opercles pale silvery bluish, dotted like the body; fins transparent, coloured like the body but more closely dotted, so as to appear pale blackish. Iris bluish silvery minutely dotted with black.

D 12 or 11—1 (adipose), C $19\frac{1}{2}$, A 14 or 15, V 9, P 11 or 12,

Br. XXIV or XXIII.

HABIT.—*Sea of Malayan Peninsula and Islands.*

Chusan, Woosung, Canton, Madura, Java, Sumatra, Tennasserim, Mouths of the Ganges, Vizagapatam, Bay of Bengal, Bombay, Malabar.

TOTAL LENGTH : 11 inch.

Measured obliquely from the muzzle to the posterior angle of the opercle, the length of the head is $\frac{1}{6}$ of the total. The diameter of the eye is $\frac{1}{16}$ of the length of the head; the distance from the muzzle is 2 diameters; that across the arched forehead 4. The angle of the mouth is at the posterior fourth of the length of the head; the jaws are equal. All the teeth are excessively slender, recurvous, and, like those of some of the *Gobioidæ*, erectile, but not flexible. They may be raised or laid down in the manner in which Cuvier describes the teeth of his genus *Salarias*, like the keys of a Piano. Those of the jaws and some of the palatals have a single barb at the posterior margin of the point; a few of the former are arrow-shaped. In both jaws appear three series of somewhat distant teeth: the external consists of excessively minute ones, the second of longer, and the internal series of the longest of all. Those of the lower jaw are longer than those of the upper, particularly three or four on each side of the symphysis. The pharyngeal and palatals consist of two series. The fourth anterior tooth of each palatal is very long. The tongue is very short, linear, and covered with fine teeth, like those of the hyoid bone and the upper margin of the branchial arches. The opercles are membranous, diaphanous and appear all blended together. The branchiostegous mem-

brane is narrow, but it projects behind the posterior radiated angle of the opercle. The branchiostegous rays are excessively slender and flexible like hairs, and they gradually increase in length backwards. The posterior ones may be seen through the lower part of the opercle. The nostrils open vertically in front of the anterior margin of the orbit; the anterior opening is the larger. The upper part of the head is arched from side to side, and cellular, covered by a thin membrane, and like the rest of the head and body by diaphanous, deciduous scales. The latter are of moderate size, oval with concentric rings. The lateral line, a little nearer the back than the abdomen, is slightly raised or keeled, and consists of about 44 rectangular membranous pieces, covered with scales like the rest of the body. The line is continued over the central pointed lobe of the caudal, and this portion contains 6 to 8 additional membranous pieces. All the scales are diaphanous and flexible, and cannot but with difficulty be distinguished in the fresh fish. The vertical diameter at occiput is $\frac{1}{8}$, at the anterior dorsal $\frac{1}{6}$, at the root of the caudal $\frac{1}{12}$ of the total length. The anterior dorsal is placed in the middle of the back, at equal distance from the muzzle and the root of the caudal. The third ray, the longest, is $4\frac{3}{4}$ in the total length; the rest gradually decrease; the last is a little more than $\frac{1}{3}$ of the third ray, of which the extent of the base slightly exceeds $\frac{1}{2}$. The first ventral ray is placed opposite the first dorsal ray, at equal distance from the muzzle and the last anal ray. The fin extends to the middle of the anal, its length being $\frac{1}{3}$ of the total. Outside the root appears a very thin elongated scale. The first anal ray is placed at equal distance from the last dorsal and the root of the caudal; the third ray, the longest, is $7\frac{1}{2}$ in the total length, and twice the length of the last ray; the extent of the base equals that of the anterior dorsal. The adipose dorsal is rather large, elongated and placed opposite the posterior third of the anal fin. The caudal is divided in three pointed lobes, of which the upper and lower are about $\frac{1}{6}$ of the total length; the central lobe, composed of the three elongated central rays, is either equal to, or a little shorter than the former two; almost the whole of the fin is covered with minute scales. The pectorals are falciform and extend in the young to the last dorsal ray, but they become shorter with age, and then vary from a little less than $\frac{1}{2}$ of to $3\frac{1}{2}$ in the total length. They appear to have no axillary scale.

The peritoneum is silvery; the stomach elongated, pyriform, thin and capable of enormous expansion; the fundus is arched, and separated from the rest by a constriction. The intestinal canal is narrow cylindrical, scarcely $\frac{1}{2}$ of the total length. At the pylorus appears a series of 22 gradually decreasing cœcal appendages. The liver and spleen are very small. The fish is of most voracious habits, gorging itself with its own species and other fishes of nearly its own size, and *Crustacea* (shrimps). It is frequently taken with the stomach and the jaws expanded with prey. It is very short-lived, more so than either of the two preceding species, and the whole body becomes at certain seasons brilliantly phosphorescent. In the Straits of Malacca it is at all times very numerous, although less so than it is at the Sandheads or in the mouths of the Ganges. Although very rich, it is a great delicacy immediately after it is taken. Salted and dried it is also highly valued, and in this state it occurs in commerce under the denomination of "*Bombay Ducks*," ("*Bummaloh*" in Bengal), large quantities of which are annually exported from Bombay and the Malabar coast to all parts of India.

FAM. CLUPEOIDÆ.

GEN. *CHIROCENTRUS*, (Cuvier, 1817) Valenciennes, 1846.

Body compressed, elongated, with small deciduous scales; abdomen trenchant, but not toothed; dorsal placed far back towards the tail, opposite the anal; pectorals pointed; in the axilla a bony, triangular, elongated appendage; ventrals excessively small; intermaxillary and upper maxillary with a single series of pointed horizontal teeth, of which one on each side of the symphysis longer than the rest; an oblique series of 5 or 6 card-like teeth on the palatals; a small oval group of velvety teeth on the anterior pterygoid, and some on the ala major; on each branch of the lower jaw a single series of long, but unequal teeth, compressed, trenchant, lance-shaped; a single series of minute conical teeth along the margin of the tongue, on the hyoid bone and the margin of the branchial arches. Branchiostegous rays eight.

